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**APPLIED FORMATIVE
EVALUATION IN THE WEB-
BASED ENVIRONMENT**

by

Anthony Basiel

**A thesis submitted in partial
fulfillment of the requirements for
the degree of**

**Master of Philosophy
School of Computing Science**

Middlesex University

January 1999

Approved by _____

Chairperson of Supervisory Committee

Programme Authorised

to Offer Degree _____

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ABSTRACT
“APPLIED FORMATIVE
EVALUATION IN THE WEB-
BASED ENVIRONMENT

by Anthony Basiel
Chairperson of the Supervisory Committee:
Professor Harold Thimbleby
School of Computing Science

The use of the Internet and specifically the World Wide Web (Web) as a media for collaboration and problem-solving is an evolving solution to the problem of increasing numbers of students in the university setting. A variety of virtual universities are appearing on the Web to address this dilemma. There are gaps, however, in these systems which do not meet the needs of the participants. This research examines the use of applied formative evaluation (feedback) methodologies and protocols, used between the stakeholders of a web-based learning environment, to facilitate the learning process.

Principles are established to guide the learning environment designer (LED), the mediator between the subject expert (SE) or teacher and the interactive multimedia web-based design team, in creating a student-centred learning space on the web. The principles and protocols developed in this research are illustrated through the DELBERT (Digital Environment Learning-Based Evaluation Response Theory) Tutorial system. This web-based collaborative, problem-solving seminar makes use of on-line tools such as; e-mail, HTML forms, Javascript and video conferencing to promote communication through a guided-discovery delivery methodology. The case studies conducted with the system support the methodologies proposed in this thesis.

Telecommunication in the area of educational technology is a rapidly changing field. Therefore, the focus of this research is not in the development of software or programming which may be out of date before its implementation. Instead, this research contributes to the design process of a web-based educational environment. The principles and protocols are aimed at supporting the applied formative evaluation methodology between the participants in the on-line learning process. In this way the research can be adapted to new technologies, beyond those adapted to the DELBERT Tutorial system, thus, not limiting itself as a contribution to the science of educational technology.

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ACKNOWLEDGMENTS

The author wishes to thank:

My supervisors:

Dr. Matthew Jones, Alan Murphy and Terry Russell

My research advisors:

Professor Harold Thimbleby and Professor Ann Blandford

My colleagues:

Dr. Jeff Mason without whose support the Philosophy case study would not have been possible, Dr. Kay Dudman, Dr. Theng Yin Leng, Mike Riddle, and Professor Steve Torrance

My friends and fellow researchers, but most especially my loving and supportive wife, Monica Platona-Basiel.

PREFACE

Before the reader should enter the topic of applied formative evaluation methods in a web-based environment as depicted in this thesis, some documentation issues should be highlighted. The general overall structure of this report is presented in four parts; the theory, the protocols, the evaluation methods, and the DELBERT (Digital Environment Learning-Based Evaluation Response Theory) software. In this way a theoretical base is first established as the foundation of the research. A web-based communication protocol is produced using the evaluation methods developed in this investigation. Finally, these principles and protocols are illustrated through the software produced for this study, the DELBERT *Tutorial* system. This examination is then supported by the pilot case study results.

To assist the reader with maintaining a mutual understanding of the terms used in this report, glossary words are italicised throughout the document. For example, the term *tutorial* in this research refers to a web-based learning system to facilitate collaboration and argumentation.

In addition to standard literature references, extensive world wide web-Internet annotations are listed with square brackets.

The fundamental research approach taken in this study is a qualitative examination of educational technology. There has been much research done in producing quantitative statistical data with relation to computer mediated conferencing (CMC) as discussed in section 3.7 of this report (Mason 1996, et al). This document argues the qualitative issues surrounding the concerns of communication and feedback in a virtual learning space. The focus is on applied formative evaluation methodologies in a web-based environment.

Chapter 1: Introduction

OBJECTIVES OF THE CHAPTER

The purpose of this chapter is to introduce the reader to the field of educational technology. Specifically, this document focuses on: “Applied Formative Evaluation in the Web-based Environment”. The key points addressed in this section are:

- The motivation and related background information for the study.
- The objectives of the research and what the reader can expect to come away with.
- An understanding of the contribution to knowledge made by this research in the area of educational technology.
- The epistemology or theory of knowledge with respect to the research methods used in this investigation.
- An overview of the topics and structure of the research document itself.

INTRODUCTION

1.0 Motivation and Background

The *virtual university* is a new paradigm which offers the seeds to the solutions for the needs of university students today (Laurillard 1996). A flexible, open learning approach is required to deal with the issues of *mass learning*. A resource-based system allows the student the freedom to access instruction based on their needs. It is open to any student from recent Further Education (FE) or High School graduate to *life-long learners* (Open University 1999). The method of delivery ranges from the traditional university lecture with one teacher to many students, to one student to many subject experts (SE) (Wilson 1996).

With the growing number of students in Higher Education (HE) there is increased demands placed on lecturers. Available time for tutoring is decreasing while university costs for resources are increasing (Laurillard 1996). This situation encourages the development of resource-based learning materials for independent study (Cochrane 1996).

The Teaching and Learning Technology Programme (TLTP 1998) of Great Britain has developed a large variety of stand-alone computer aided learning (CAL) software applications in recent years in response to these demands. Difficulties arose in cross platform compatibility. Programmes designed for one operating system would not function on another. Specialisation of content was another difficulty. Material developed at one university was not easily adopted by another for use. A learning *system or environment* which was platform independent and not bound to any specific subject matter was needed (Basiel 1997).

This research offers a solution to both of these needs. The world wide web (WWW) is a rich, multimedia environment of the Internet. Its use is supported by British Education policy so that :

“by 2002, all schools will be connected to the superhighway, free of charge; half a million teachers will be trained; and our children will be leaving school IT-literate, having been able to exploit the best that technology can offer (Blair 1997).

Since it is platform independent, web-based systems will function on a variety of operating systems such as; DOS, Windows (3.x, 9x, NT, etc.) Apple-Mac OS, Unix, Linux, etc.

This document describes the *principles and protocols* to produce a learning shell which is not bound to any particular subject matter. The DELBERT (Digital Environment Learning-Based Evaluation Response Theory) *Tutorial* system (chapter 5) is the application produced to illustrate the use of applied formative evaluation methodology. This feedback system between participants is detailed in chapter 3 of this report.

A stand-alone system will not easily provide this feature. The WWW can support asynchronous communication in the form of e-mail and forum discussions as well as synchronous exchange as seen in live text chat and video conferencing (Brunner 1998). These on-line communication tools are analysed in chapter 4 of this study.

The virtual university needs a software design team to liaise with the tutor or

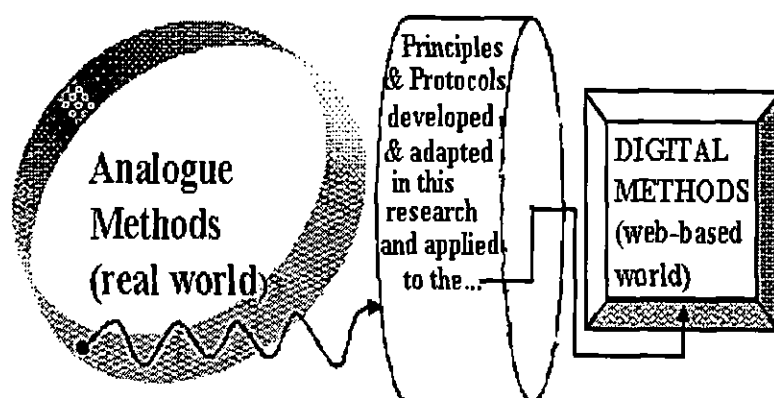


Figure 1.00

Analogue-to-web methods

subject expert (SE) for the production of this web-based learning environment. This team is comprised of several key people; the programmer, the graphic artist and the learning environment designer (LED). The LED's role is to interview the tutor with the intent to decompose the elements of the real-world (analogue) classroom and reconstruct it in a virtual (digital) learning space. Thus, as a general rule, this report examines proven principles and methodologies employed in education and adapts them to an on-line setting.

What is needed is a means of evaluating this medium (Mason 1996). This research establishes a set of guidelines to aid the LED in the creation of a web-based learning environment. These guidelines are used to establish the SOFA (Student-centred On-line Formative Activity) principle which serves as a basis of proposing the DELBERT interim-Theory (chapter 3). With the rapidly changing nature of computing science this document will better benefit the LED by supplying design principles and communication protocols rather than a focus on a technology which could soon become obsolete.

1.1 Objectives and Deliverables

The following questions serve as the research questions for this thesis. The table which follows is intended to show the relationship between the three strands of this study; Constructivist Learning Theory, Collaborative Problem-solving Protocols and a web-based learning environment illustrated through the *DELBERT Tutorial* system. This program can be found at: [<http://skip.mdx.ac.uk/>]

Research questions:

- 1) Can Web-Constructivism and collaborative problem-solving protocols support a web-based tutorial system using applied formative evaluation methodologies and on-line communication tools?
- 2) Can a set of principles be established to support an interim-theory (hypothesis) to guide the learning environment designer (LED) through the design process of a web-based learning environment?

The following table is a general overview of the research issues. It shows the relationship between; the learning principles adapted to the web (Web-Constructivism), the problem-solving seminar protocols and the applied formative evaluation (feedback) methods illustrated in the tutorial system software.

Table1.10
General Overview of Research Issues

CONSTRUCTIVISTS LEARNING PRINCIPLES	COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	DELBERT TUTORIAL SYSTEM FEATURES
1) Learning should start from open-ended problem-solving questions.	<i>[1] START PROBLEM & RELATED BACKGROUND CONTENT</i>	1. Tutorial assignments are presented in multimedia format as a problem to solve.
2) Student readiness for learning is the combination of motivation with prior knowledge and experience.	<i>[2] DRAW ON PRIOR KNOWLEDGE & EXPERIENCE</i>	2. Javascript allows an HTML editor as an annotation page.
3) EPISTEMOLOGY Knowledge is not external from the student.	<i>[3] DEVISE AND IMPLEMENT A RESEARCH STRATEGY</i>	3. On-line resources within the tutorial and links to outside sources.
4) ACTIVE LEARNING Empower student ownership in the learning process with active participation. 5) REFLECTION is conceptual evaluation 6) COLLABORATION is socially constructed knowledge	<i>[4] FORM AN INITIAL CONCLUSION TO THE PROBLEM TO ARGUE WITH PEERS [5] COMPARE SOLUTION TO A SAMPLE (EXPERT) ANSWER AND ARGUE TO FORM A REVISED / REAFFIRMED CONCLUSION</i>	4. WEB-BASED COMMUNICATIO N TOOLS Use e-mail, HTML forms, Javascript and video conferencing to communicate.
7) TEACHER'S ROLE is a mentor and coach.	<i>[6] BASED ON FEEDBACK GAINED THROUGH APPLIED FORMATIVE EVALUATION METHODS THE TUTOR AND LEARNING ENVIRONMENT DESIGNER (LED) REPLY TO STUDENT QUERIES AND/OR POST CHANGES TO THE TUTORIAL CONTENT or DELIVERY</i>	5. STUDENT FEEDBACK is sent through on-line communication tools.

Table 1.10
General Overview of Research Issues...

CONSTRUCTIVISTS LEARNING PRINCIPLES	COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	DELBERT TUTORIAL SYSTEM FEATURES
8) NORM REFERENCED ASSESSMENT is peer review to measure improvement	[7] THE STUDENT COMPARES THEIR SOLUTION TO THEIR PEERS AND AN EXPERT EXAMPLE TO EVALUATE THE AMOUNT OF IMPROVEMENT MADE FROM THE FIRST TO THE SECOND ENTRY	6. ON-LINE ASSESSMENT Qualitative and quantitative tools can measure student progress.

Table 1.11 expands the details of the Web-Constructivist principles to greater detail and provides a more itemised description of the tutorial system features.

Table 1.11
Research Overview: Detailed Examination

CONSTRUCTIVISTS LEARNING PRINCIPLES	COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	DELBERT TUTORIAL SYSTEM FEATURES
1. (a) The starting task should be a realistic and relevant problem to solve (not rote memorisation) which involves higher level cognitive skills such as classifying, analysing, predicting, creating and evaluating. It should be presented as an open- ended question to guide the learning experience. (b) Multiple forms of representation for information should be used.	[1] START PROBLEM & RELATED BACKGROUND CONTENT	I. The lesson assignment (goal) is presented to the student / stakeholder in appropriate multimedia format such as text, still graphics, animation, animated-video and/or sound. The relevant background information connected to the assignment is also presented in a multimedia format.

Table 1.11
Research Overview: Detailed Examination...

CONSTRUCTIVISTS LEARNING PRINCIPLES	COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	DELBERT TUTORIAL SYSTEM FEATURES
2) Readiness must be considered in the learning experience. Prior knowledge / experience and its context is what makes the student willing and able to learn. New knowledge is constructed from prior knowledge and the motivation to gain it.	[2] <i>DRAW ON PRIOR KNOWLEDGE & EXPERIENCE</i>	2. The opportunity to annotate any prior knowledge and experience is given to the student in the form of a Javascript HTML Editor page window. This digital note pad can be used at any time in the lesson.
3) Knowledge is not independent of the learner. It is a personal interpretation of the world.	[3] <i>DEVISE AND IMPLEMENT A RESEARCH STRATEGY</i>	3) Use INTERNAL tutorial resources such as the glossary and suggested web links and EXTERNAL web-based resources such as search engines, e-mail and Mentor Help to conduct research.
3) Learning is an active, iterative <i>PROCESS</i> , not a <i>PRODUCT</i> . It is ownership of this learning process which promotes motivation in the educational experience. 5) REFLECTION is central to learning. Ideas must be revisited and evaluated to become knowledge. 6) Collaborative construction of knowledge through social exchange is encouraged through dialogue.	[4] <i>FORM AN INITIAL CONCLUSION TO THE PROBLEM TO ARGUE WITH PEERS</i> [5] <i>COMPARE SOLUTION TO A SAMPLE (EXPERT) ANSWER AND ARGUE TO FORM A REVISED / REAFFIRMED CONCLUSION</i>	4. Use various on-line tools to communicate with participants in the lesson: <ul style="list-style-type: none"> * E-MAIL for contacting peers and experts * HTML forms to post conclusions to the group * Mentor Help feature to e-mail previous students for advice on the assignment * Video Conference the tutor to discuss the learning experience

Table 1.11
Research Overview: Detailed...

CONSTRUCTIVISTS LEARNING PRINCIPLES	COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	DELBERT TUTORIAL SYSTEM FEATURES
7) The teacher's role has evolved into that of a <i>pioneer-scout</i> guiding the student through the learning experience as opposed to the all-knowing sage-on-the-stage.	[6] <i>BASED ON FEEDBACK GAINED THROUGH APPLIED FORMATIVE EVALUATION METHODS THE TUTOR AND LEARNING ENVIRONMENT DESIGNER (LED) REPLY TO STUDENT QUERIES AND/OR POST CHANGES TO THE TUTORIAL CONTENT OR METHOD OF DELIVERY</i>	5. Tutorial Content is modified by: * Students in the Active Entry Pages * LED and Tutor through filtered e-mail messages, HTML form postings and/or video conference interviews
8) Assessment is viewed as formative feedback. Peer review and self-evaluation is the norm referenced method used to gauge student progress. A summative, standardised exam is not used.	[7] <i>THE STUDENT COMPARES THEIR SOLUTION TO THEIR PEERS AND AN EXPERT EXAMPLE TO EVALUATE THE AMOUNT OF IMPROVEMENT MADE FROM THE FIRST TO THE SECOND SUBMISSION</i>	6. Javascript self-assessment tools can be embedded into the content delivery to reinforce the student's comprehension. The HTML forms post the student's submission for critical review from peers and subject experts.

Based on this research a principle is developed to guide the learning environment designer (LED) in the process of creating a web-based learning environment. This principle, the product of Web-Constructivism, collaborative problem-solving protocols and applied formative evaluation methods is called the SOFA principle.

The SOFA Principle

The Student-centred On-line Formative Activity (SOFA) Principle states that: By adapting Web-Constructivist learning principles to a

communication protocol a set of guidelines can be produced to aid the Learning Environment Designer (LED) in producing a web-based tutorial system.

Through the case studies conducted in chapter 6 of this document the SOFA principle supports the DELBERT interim-Theory:

The DELBERT Interim-Theory

Upon the implementation of the SOFA principle a web-based, problem-solving seminar environment will support collaboration and argumentation through the use of applied formative evaluation methodologies.

1.2 Contribution to Educational Technology

By its very name educational technology is a cross disciplinary study. It is both an examination of the social science of education and the technology of computing science. Distance learning of this type is more art than science (Stufflebeam and Webster 1980, Jonassen 1994). This research makes a contribution to knowledge in each area of study. It benefits the learning environment designer (LED) who must wear the hat of educationalist and be rooted in the technological constraints of the on-line tools available at the time (chapter 4).

The contribution to education is two-fold. First, a through examination of learning theory produces a foundation from which the rest of the study is built upon, Web-Constructivism. Constructivism, currently the dominant learning theory (Hein 1995), is broken into its component principles which are then adapted to the web-based learning environment. Secondly, a problem-solving, seminar-based protocol is investigated and enhanced to support higher cognitive skills through telecommunication tools (chapter 3).

These principles and protocols are illustrated through the web-based software application, the DELBERT Tutorial system which highlights the contribution of this thesis to the field of computing science. Several on-line tools are developed and adapted to support applied formative evaluation methods (feedback) with the DELBERT learning shell. These tools, examined in greater detail in chapter 4 are:

- E-mail
- E-mail surveys
- HTML forms
- Javascript
- Video Conferencing

The SOFA (Student-centred On-line Formative Activity) Principle builds into the DELBERT interim-Theory which intends to serve as a guideline to the LED in the development process of a web-based learning environment. This research takes Web-Constructivism and applies it to a collaborative problem-solving protocol. Through a set of case studies (chapter 6) the SOFA Principle and DELBERT interim-Theory are illustrated and supported.

1.2.1 Limitations of the Study

The focus of this research is the application of formative evaluation to a web-based problem-solving seminar. It is recognised that this excludes other forms of knowledge outside of a problem-solving context. Another issue not addressed in this study is summative assessment. The DELBERT Tutorial system can be easily adapted to include various forms of assessment such as; self-assessment, peer-review, and on-line matching / multiple-choice exams. This will need to be an added feature of the next version of the software.

Other supportive technologies such as virtual reality and artificial intelligence were investigated for this research. It was decided, due to time restraints, not

to develop the tutorial system in these areas. Human Computer Interaction (HCI) usability principles are relevant to this area of research, but not extensively analysed in this report. Further work in this area can link the software design cycle to the instructional design principles for a web-based tutorial system.

The purpose of this thesis is to propose principles and protocols to support a problem-solving seminar on the web through the use of applied formative evaluation methodologies. This was done by adapting the Constructivist Learning theory to the web. It is recognised that there are many learning theories not developed in this report (Funderstanding & GWU 1998). Web-Constructivism was selected for the case study analysis. The DELBERT Tutorial system is intended to illustrate the principles and protocols of this research. However, it is only a prototype. The case study sampling groups were not large enough to produce a quantity of statistical data for rigorous analysis. Nor were all of the features utilised in the software for the pilot examinations. This will need to be continued in the full study.

The intended reader of this document is the computer scientist in the guise of the learning environment designer (LED). Educational technology is, however, a cross discipline. As such an emphasis has been placed on the educational aspects of investigating the issues. A qualitative approach has been taken for the research methodology. A contribution to computing is in the adaptation of the on-line tools implemented in the software produced in this research.

These limitations in the study do not detract from the contribution it makes in the field of educational technology. Through an extended case study over a longer period of time with a larger sampling group many of these issues can be addressed in greater detail.

1.3 Research Epistemology

This report supports the position that ones epistemological views (theory of knowledge) dictate ones pedagogical constructs (science of teaching). The way knowledge is perceived defines how it will be communicated. This study shows how ones beliefs about the nature of knowledge profoundly influences the approach used in a virtual university. Even the narrative used in writing a report about the approach is influenced (Hein 1995).

Knowledge is the conceptual means to make sense of experience, not just the representation of something that is supposed to lie beyond it. This interpretation sees concepts and relations in the experimental world as generated by the individual. In other words, a contribution to knowledge can not be viewed in the Behaviourist sense which states that knowledge is something existing outside the individual, to which this report incrementally adds. Instead, knowledge is individually constructed (Constructivism - chapter 2), residing within the mind of the reader this report or the student experiencing the tutorial system (Hein 1995).

Similarly, the method of approaching the research questions needs to be clarified from the start. This investigation uses an inductive approach. That is to say, an examination of the *effects* (the DELBERT Tutorial Case Study in chapter 5) will support the *cause* (principles and protocols developed in chapter 3). This research methodology forms an iterative cycle of formative evaluation (chapter 3) as illustrated in Figure 1.30 below.

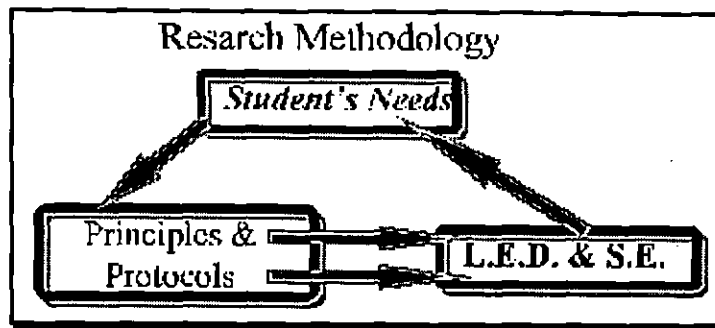


Figure 1.30
Iterative cycle of formative evaluation

The stated aim of this research is to provide the seeds to the solution in fulfilling the needs of the (virtual / on-line) university student which can be achieved by the LED / subject expert (SE) using the principles and protocols developed in this research. The student then redefines their needs which is interpreted through the tutorial systems protocols. The feedback is then given to the LED/SE who redesign the system to meet the student's needs.

1.4 Thesis Structure

This report is organised in a consistent format to aid the reader with the narrative by having each chapter state a specific goal or issue to be investigated. Next, the methodology for researching this topic is explained. A resolution for the issue is offered in each summary discussion section. Within this discussion an evaluation of the conclusion will be analysed offering future alternatives. The following overview summarise the content of this report by chapters:

Chapter 2: Web-Constructivism

This chapter provides the theoretical foundation upon which the other chapters are built. Constructivism, the current dominant learning theory (Hein 1995) is discussed in a literature review through a comparative analysis with Behaviourism (Skinner 1968). The principles composing Constructivism are

compiled from a selection of educationalists. Next, the attributes of a web-based learning environment are examined. The result, Web-Constructivism, is the product of adapting Constructivist learning principles to a web-based environment. The strengths and weaknesses of this theory are discussed.

Chapter 3: Protocols for Applied Formative Evaluation Methods

With Web-Constructivism acting as a set of guidelines, protocols are established in this chapter which direct the communication between the participants in this web-based system. Applied formative evaluation methods are the result of this investigation. A feedback system is presented with the intent to serve the learning environment designer (LED) as a check list in the design process for a web-based tutorial. The result discussed in the summary is a collaborative, on-line problem-solving seminar.

Chapter 4: Adapted On-line Tools

This chapter examines various world wide web tools currently available to support applied formative evaluation methods to produce a collaborative problem-solving seminar learning environment. E-mail, e-mail surveys, Javascript, HTML forms and video conferencing is applied and adapted to support the principles and protocols introduced in the previous chapters. It is the appropriate use of these on-line communication tools guided by applied formative evaluation methods that compose the DELBERT (Digital Environment Learning-Based Evaluation Response Theory) Tutorial system discussed in the next chapter.

Chapter 5: Illustrating the Principles and Protocols: The DELBERT Tutorial System

Key technological features created for the software application developed through this research are explained. These tools are supported by Web-Constructivism (chapter 2) and applied formative evaluation methodologies used to produce a communication protocol (chapter 3). A user manual is produced to orientate the student to the effective use of the DELBERT

Tutorial system's resources. These guidelines also act as a manual to aid the LED in producing templates to recreate the DELBERT Tutorial system for any problem-solving scenario.

Chapter 6: Research Methodology: Case Study Analysis

Chapter six defines the research methodology employed by adopting a Constructivist approach. Several pre-pilot case studies demonstrate various stages of both software development and implementation of applied formative evaluation methods. Two pilot studies are reported which combine Web-Constructivist learning principles with a problem-solving seminar setting, supported by appropriate on-line communication tools. An analysis of the case study results concludes a successful convergence of these factors; learning principles, protocols and on-line communication tools, to create a web-based learning shell. Full case study recommendations are proposed in the next chapter.

Chapter 7: Summary Discussion

Constructivist reflections summarise the principles discussed in this dissertation highlighting the core issues illustrated through the use of the DELBERT Tutorial system in the various case studies. Next, a critical analysis is presented in a series of tables to summarise the evidence produced in this research. This discussion is supported by the documentation in the appendix. The Error Elimination Approach to evaluation is discussed. This approach will be adapted in the full case study to support the development of an instructional system for the web (Ellington 1995).

The full case study should be conducted over at least one academic term. It will utilise all of the DELBERT Tutorial system features that were not fully exploited in the pilot studies (i.e. – Weblinks pages, Active entry pages, Mentor help, etc.). A larger sample representation will produce a greater quantity of statistical evidence. The analysis of this data should produce a

result that makes a valid contribution to knowledge in the study of educational technology.

OBJECTIVES OF THE CHAPTER

This chapter examines the characteristics of the Constructivist learning theory and adapts it to a web-based setting. The following key points are what the reader of this section should expect:

- An examination of the relationship between knowledge and learning theory.
- A comparison between Behaviourism and Constructivism.
- A description of the characteristics of a web-based learning environment.
- A critical analysis of why Constructivism is a sound theoretical base to build an on-line learning system.

Chapter 2: Web-Constructivism

2.0 In Brief –

"If you have any doubt about how learning happens, engage in a sustained inquiry: study, ponder, consider alternative possibilities and arrive at your belief grounded in evidence." (Dewey 1993)

This chapter will set the theoretical foundation upon which the rest of the report is built. It is essential to examine knowledge and learning theory to understand the rationale for the approaches used in this study.

Constructivism is the learning theory that this research adapts to a web-based learning environment (WLE). Key Constructivist principles are applied to produce a learning model which helps guide the learning environment designer (LED). The role of the LED is to liaise between the subject matter expert (SME) / content provider for the learning space and the programmers / interface designers of the educational multimedia team.

2.1 Knowledge and Learning Theory

One's beliefs about the nature of knowledge, one's epistemology, profoundly influence the approach to education (Hein, 1995). There are many learning theories stemming from as far back as the time of Plato [2.1], [2.2]. This table (Table 2.00) suggests that the choice of metaphor is not a neutral decision, it can influence one's views on instruction [2.3].

If Knowledge is seen as...	Then instruction is viewed as...
An amount of content to students...	<i>A product to be delivered by a vehicle</i>
A cognitive state as seen in a person's schemas and procedural skills...	<i>A set of instructional strategies aimed at changing the individual's schemas</i>
A person's meanings constructed by interaction with their environment...	<i>A learner drawing on tools and resources within a rich environment</i>
Enculturation or adoption of a group's ways of seeing and acting...	<i>Participation in a community's everyday activity</i>
Table 2.10 Comparison of Epistemology and Instructional Strategy	

This overview (Figure 2.10) shows the relationship between the understanding of knowledge and learning represented as an epistemological dichotomy. The extreme positions are at the end of the axis (Hein 1995) [2.4].

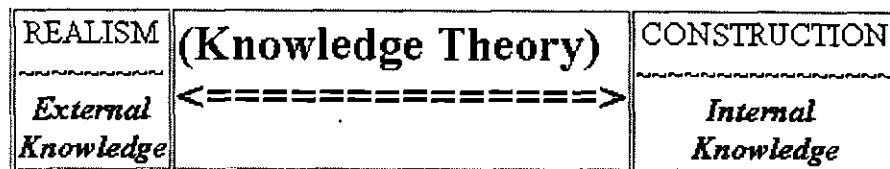


Figure 2.10 Bi-polar views of knowledge

These opposing views see knowledge as facts existing independently of the learner or as mental constructs/representations by the student (Hein 1995) [2.4].

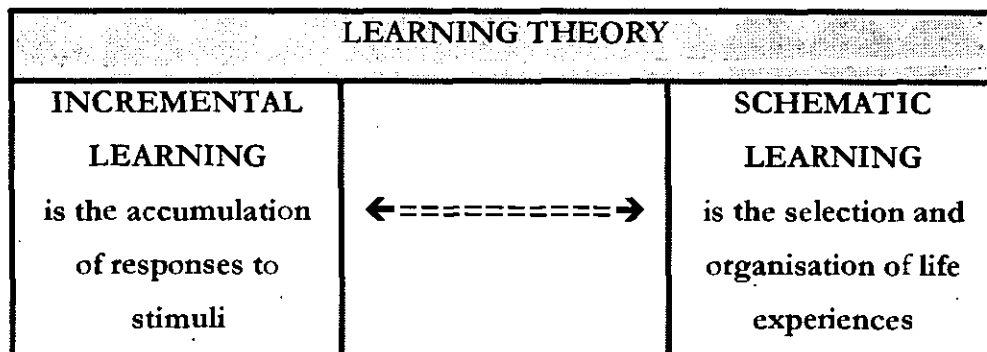


Figure 2.11. Contrasted of Behaviourism (left) & Constructivism (right)

Behaviourist believe that the mind starts as a blank slate which grows by adding simple-to-complex information [2.5]. Operant conditioning occurred when a response to a stimulus is reinforced. If a reward or reinforcement follows the response to a stimulus, then the response becomes more probable in the future [2.1].

The central premise of operant conditioning is that behaviour is shaped by its consequences. Behaviour is formed by patterns of reinforcements or

rewards in environment. Behavioural objectives are specified as desired learning outcomes in terms of measurable behavioural targets. This desired behaviour can then be shaped by arranging the reinforcement of a series of intermediate steps that lead to the target behaviour. It was argued that by rigidly optimising the presentation of learning material the learning process could be optimised (Boyle 1997).

"...the main root of the trouble is that for 50 years of this century, we have suffered the virtual undisputed domination of a mindless behaviourism. The behaviourists succeeded in eliminating the distinction between training (for performance) and teaching that aims at the generation of understanding. All learning was reduced to a model that had been derived from experiments with captive pigeons and rats..." (von Glaserfeld S&G p.4) [2.4]

In opposition to the Behaviourist, the Constructivist postulate that the learner's mind constructs schema (conception of a general type/essential form or organisation of life experiences) and that learning consists of selecting and organising information from a wealth of sensations to build knowledge. This view of learning was exemplified by Piaget's work (Hein 1995).

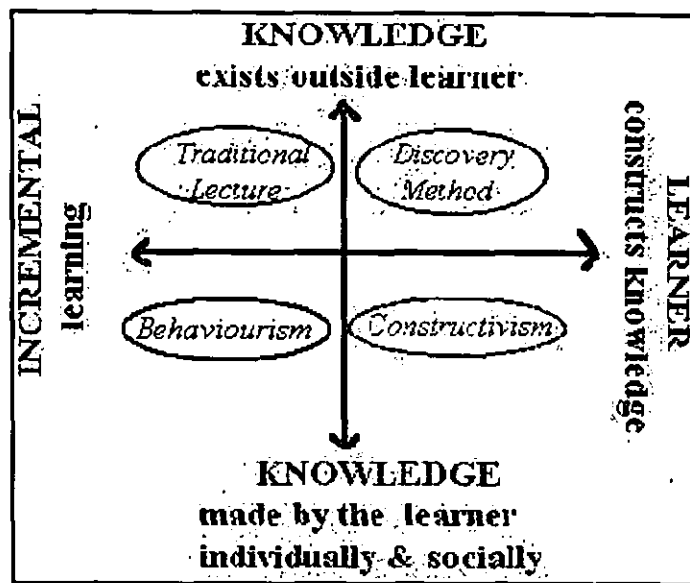


Figure 2.12 A matrix of learning
and knowledge theory

By combining figures 2.10 and 2.11 the new matrix shows relationships between various teaching methods or learning environments. The traditional lecture (top left) has the student adding bits of information to their knowledge after attending each presentation. The discovery method (top right), endorsed by Papert, has the student directing their course of learning of information (Papert 1994). Behaviourism (bottom left), as mentioned before, sees learning as the result of a direct stimulus-response experience.

"Constructivism in education is a cognitive perspective of learning with profound implications for teaching and research methodology." [6] All cognitive perspectives focus on mental behaviours. In cognitive views of learning, the ...active work of mental behaviour turns information into useful knowledge"
(Gabe/Gabe 1998).

The following components comprise the theoretical framework of Constructivism (Wilson 1995):

- mind is real: mental events are worthy of study
- knowledge resides in the mind
- knowledge is dynamic
- meaning is constructed
- reflection / abstraction is critical to becoming an expert
- learning includes constructing representations
- teaching is negotiating construction of meaning
- thinking and perception are inseparable
- problem solving is central to cognition

Constructivism as part of a cognitive family tree, branches out to many directions with a rich history in philosophy, psychology and education (Mahoney 1994). Today constructivist-orientated research, classroom pedagogy and spirit builds on key contributions from educators such as Piaget, Dewey, Vygotsky, Bruner, Jonassen, Hein, Boyle and others [2.6]. The next section is an elaboration of constructivist principles.

2.2 Constructivist Principles

The following table takes the key points of Appendix A, an archive of various Constructivist principles, and summarises them as they relate to their application to the protocols and formative evaluation methods used in this study.

Table 2.20
Critical Analysis of Web-
Constructivism

BASIC CONSTRUCTIVISTS LEARNING PRINCIPLES	EXPANDED WEB-CONSTRUCTIVISTS LEARNING PRINCIPLES
1) PROBLEM-SOLVING Learning should start from open-ended problem-solving questions.	1) (a) The starting task should be a realistic and relevant problem to solve (not rote memorisation) which involves higher level cognitive skills such as classifying, analysing, predicting, creating and evaluating. It should be presented as an open-ended question to guide the learning experience. (b) Multiple forms of representation for information should be used (i.e. multimedia).
2) PRIOR KNOWLEDGE Student readiness for learning is the combination of motivation with prior knowledge and experience.	2) Readiness must be considered in the learning experience. Prior knowledge / experience and its context is what makes the student willing and able to learn. New knowledge is constructed from prior knowledge and the motivation to gain it.
3) EPISTEMOLOGY Knowledge is not external from the student.	3) Knowledge is not independent of the learner. It is a personal interpretation of the world.
4) ACTIVE LEARNING Empower student ownership in the learning process with active participation.	4) Learning is an active, iterative <i>PROCESS</i> , not a <i>PRODUCT</i> . It is ownership of this learning process which promotes motivation in the educational experience.

Table 2.20 Critical Analysis of Web-Constructivism	
5) REFLECTION is conceptual evaluation	5) REFLECTION is central to learning. Ideas must be revisited and evaluated to become knowledge
6) COLLABORATION is socially constructed knowledge	6) Collaborative construction of knowledge through social exchange is encouraged through dialogue.
7) TEACHER'S ROLE is a mentor and coach.	7) The teacher's role has evolved into that of a pioneer-scout guiding the student through the learning experience as opposed to the all-knowing sage-on-the-stage.
8) NORM REFERENCED ASSESSMENT is peer review to measure improvement (Biggs 1982).	8) Assessment is viewed as formative feedback. Peer review and self evaluation is the norm referenced methodology used to gauge student progress. A summative, standardised exam is not used.

The next table (2.21) is a critical analysis of the strengths and weaknesses of Web-Constructivism. For this comparison only the basic principle is given, not the expanded explanation.

Table 2.21
Critical analysis of Constructivist principles

BASIC CONSTRUCTIVISTS LEARNING PRINCIPLES	PRINCIPLE'S STRENGTHS	PRINCIPLE'S WEAKNESSES
1) PROBLEM-SOLVING Learning should start from open-ended problem-solving questions.	1) Learning and recall is highest in a multimedia format (table 3.4). Applying problem-solving strategies reinforces the learning process (table 3.2).	1) (a) Although problem solving is a higher level cognitive task not all subject matter is easily adapted to this format (see table 3.1). (b) Not all students are developmentally prepared to work at this level. Students progress from concrete to abstract thinking (Biggs 1982, Bruner 1966). (c) Simply displaying content in multimedia format does not guarantee comprehension.
2) PRIOR KNOWLEDGE Student readiness for learning is the combination of motivation with prior knowledge and experience.	2) The open-ended question start makes a specific prior knowledge less critical in a problem-solving seminar.	2) The teacher/tutorial system can not anticipate the prior knowledge of each individual student.
3) EPISTEMOLOGY Knowledge is not external from the student.	3) Student knowledge is measured by the difference of pre- and post- evaluations.	3) The student's personal knowledge is not easily qualified or measured.
4) ACTIVE LEARNING Empower student ownership in the learning process with active participation.	4) A computer log can track student participation in key features (i.e. - Active Entry Pages) of the tutorial system.	4) A learning process (v. product) does not easily yield (quantitative) summative assessment results.
5) REFLECTION is conceptual evaluation	5) This tutorial system supplies the resources to support reflection in the learning process.	5) Students must be given the opportunity for reflection, but unguided this can lead to day dreaming.

Table 2.21 Critical analysis of Constructivist principles...		
BASIC CONSTRUCTIVISTS LEARNING PRINCIPLES	PRINCIPLE'S STRENGTHS	PRINCIPLE'S WEAKNESSES
6) COLLABORATION is socially constructed knowledge	6) This tutorial system supplies a communication protocol which guides the collaborative dialogue in the problem-solving seminar.	6) Open, un-moderated dialogue may take the student away from the focus completing the assignment.
7) TEACHER'S ROLE is a mentor and coach.	7) Teachers adopting the role of learning <i>with</i> their students in the experience of the tutorial lesson have less pressure on them to be seen as an all-knowing expert.	7) Traditional teachers have difficulty adopting the new identity. Additional training is needed to prepare teachers in their role to guide the student using technology.
8) NORM REFERENCED ASSESSMENT is peer review to measure improvement (Biggs 1982).	8) By shifting the onus for assessment to the student, pressure is taken from the tutor and more time is made available for guidance.	8) Education institutions still require criteria referenced assessment for their degree based programmes (Biggs 1982).

2.3 Defining the Web Environment

Until now this discussion has been based in the analogue (real) - world. It is the intent of this chapter to show how Constructivism can be developed, adapted, and applied to a web-based learning environment. To do this properly a clear definition of the characteristics of such a learning space needs to be presented.

Appendix A, an archive of Constructivist principles, presents a large number of elements which could potentially be mapped into Web-Constructivism, principles adapted to a web-based learning environment. Only a select number of principles outlined in the previous table (Table 2.21) are critically

analysed since they correspond to the protocols discussed in the next chapter (see Table 3.60).

Presenting the learning process in an open-ended problem has the potential to take advantage of the webs multimedia presentation formats (i.e. - text, sound, graphics, animation, etc.) but does not guarantee comprehension.

The student's readiness for learning, the combination of motivation with prior knowledge/experience, is an important element of the learning process, but not one easily anticipated by the tutorial system.

The knowledge gained by the student from using the tutorial system is the difference of pre-and-post evaluation. It is not easily measured if viewed as an internal process.

This active learning process empowers student ownership but increases the difficulty to gather summative assessment. During this learning activity reflection, conceptual (re)evaluation, needs to be supported.

Through collaborative dialogue knowledge is socially constructed. This discourse needs to be focused on task completion. In this learning situation the teacher's/system's role is to guide/moderate the student's actions. Measuring the success of the learning, the difference of knowledge level before and after use of the tutorial system, can be done through peer review. However, most educational institutions still require criteria referenced (exams) assessment methods. It is these Constructivist principles which underpin the web-based learning environment developed in this research.

2.3.1 Presentation Methodology

This section examines two methods of presenting information; linear and non-linear (Theng 1997). There are more variations than those discussed in this section, however, due to time restraints this is not a major focus of this

study. A linear approach is closed with no real choice offered to the student. (figure 2.31)

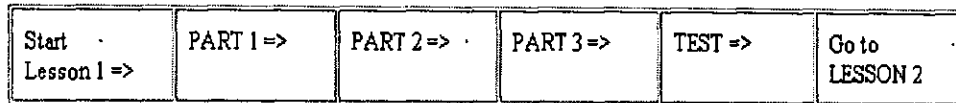


Figure 4.31
Linear delivery of data

In this situation the student must complete PART 1 before going onto PART 2 and PART 3. A TEST must be passed before progressing onto new, more complex material in LESSON 2. The book metaphor illustrates this in a classroom setting. Computer Based Training (CBT) used this Behaviourist Theory with its Traditional Instructional Design Approach (Boyle 1997). One variation of the linear design can be added by allowing the student an opportunity for remediation if mastery is not achieved. (Figure 2.32)

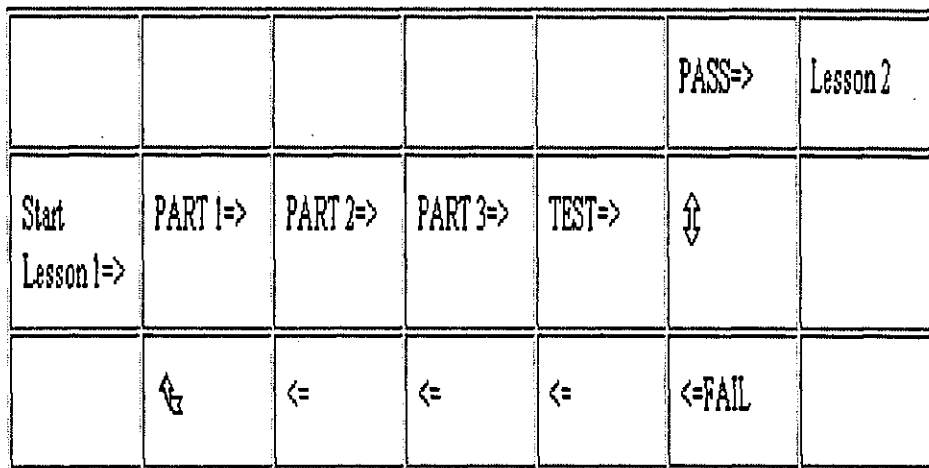


Figure 2.32 Remediation of non-mastery

A non-linear system is more open. This could be seen to use a Discovery Method in its presentation of content. Here an unrestricted menu allows the student to begin anywhere in the material. Once, begun the path of delivery is still linear, however. (Figure 2.33)

	LESSON 1: Start ↘	↘
↘ [PART 1]	↘ [PART 2] ↘	↘ [PART 3] ↑
	[TEST] PASS ↘ FAIL =>	=>=>=>=>=>=> ↘
	Lesson 2	

Figure 2.33 Discovery method of information presentation

A hypertext system, as used in the world wide web, offers the content in yet another way. Here a non-hierarchical mapping best represents the choice of path the student may follow in the pursuit of knowledge. (Figure 2.34)

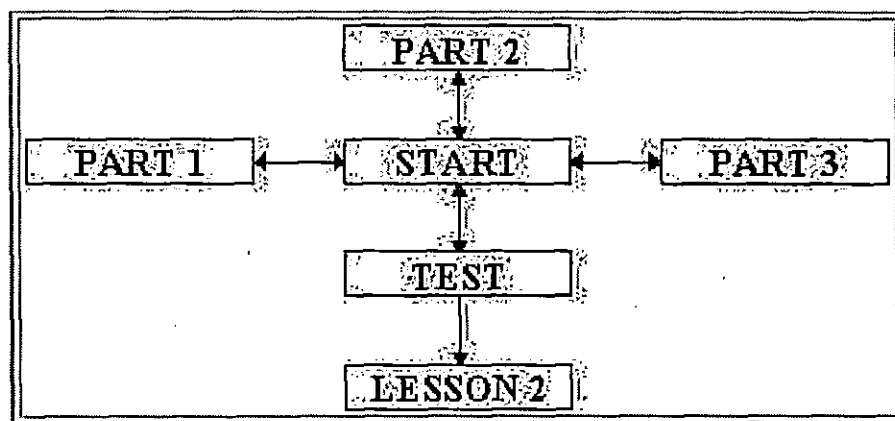


Figure 2.34
Non-linear mapping of information

Although the navigational path for presentation of this information is open

the content is fixed, set by the tutor. The freedom offered by the world wide web opens the accessibility to new (sometimes unplanned for) information. This means that resources outside the tutorial system can be accessed as seen in the right side of the illustration (figure 2.35).

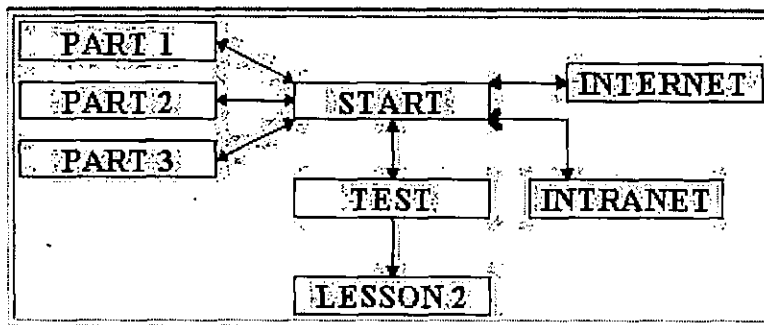


Figure 2.35
Information gained
outside the tutorial

2.3.2 The Dynamic Nature of the Web-based Environment

Information presented in book format is stagnant in the sense that it can only be updated as quickly as the new material can be published and distributed. The electronic word has a different personality (Lanham 1993). It can be modified and distributed almost instantly. It is this fluid nature of the material on the web that appeals to people dealing with information that is constantly changing. For example, British Telecom Research keeps their library resources and research publications in a digital format (Cochrane 1995/96). [2.8] [2.9] To better understand the transitory nature of this environment imagine this scenario. In the analogue (real)-world the student goes to the library for a journal to read a specific article of interest. There are pre-set expectations. First, the road used to navigate there stays the same. Second, there is a direct relationship between the signs outside the buildings and their purpose. If this information did not remain constant then the outcome (getting the article) would be difficult to attain.

Now place the same scenario into a web-based setting. The information sought is some digital text on a web server located somewhere across the world. Digitally navigating there via a uniform resource locator (URL) or web address is a complex process that can be achieved through several methods. The student may already know the URL. Perhaps it was listed in a magazine article, posted in a newsgroup message or a link on a web page. Conversely the student may not know the address, in which case an Internet search needs to be carried out. This may be done one of many search engines (Yahoo, Excite, Infoseek, etc.) using key words or meta-tags. The path the student's search engine travels to arrive at the URL can vary each time a search is conducted. The link is made in the same way as a driver may travel a different street to arrive at the library. Outside the building a sign helps the student recognise its purpose. Its digital counterpart may not be as clearly understood. To complicate matters the student may not be able to access the website. An alert box message: "Unable to connect to this DSN at this time" or "HTTP/1.0 404 Object not found" is the dread of every web surfer. It may be that the host server of the web page is down or that the server is operational but overwhelmed by the number of hits it is receiving. Another possibility is that the HTML file itself is no longer in the directory. It could have been moved to a new location or deleted. Sometimes it is human error. The student simply mistyped the URL (website.html instead of website.htm). Due to this quality of the web it is recommended practice when referencing the web for an academic publication to include the date the URL was last visited [2.10]. The student must also learn to read web information with a critical eye. [2.11] Unlike a refereed paper published in an accepted journal or conference information of the web can be unedited or uncensored.

2.3.3 Expanding Layers of Information on the Web

Although information on the web appears on the computer monitor in a two-dimensional form its nature is three-dimensional. That is to say that information in the real world occupies 3-D space in time. There is a lateral association style of connecting related information to transform it into knowledge. The organisation of the HTML, graphics and multimedia files may be viewed in the traditional tree structure on the local level. Information at this site can be controlled by the subject expert / tutor (SE) and the learning environment designer (LED). Links can be made to information on an intranet level. This data may be on the university or corporate web server. Expanding outwards to the internet the student can link to information on the world wide web. This upwards spiral of linking to information sets up a student learning model that can be adapted and applied to a web-based learning environment

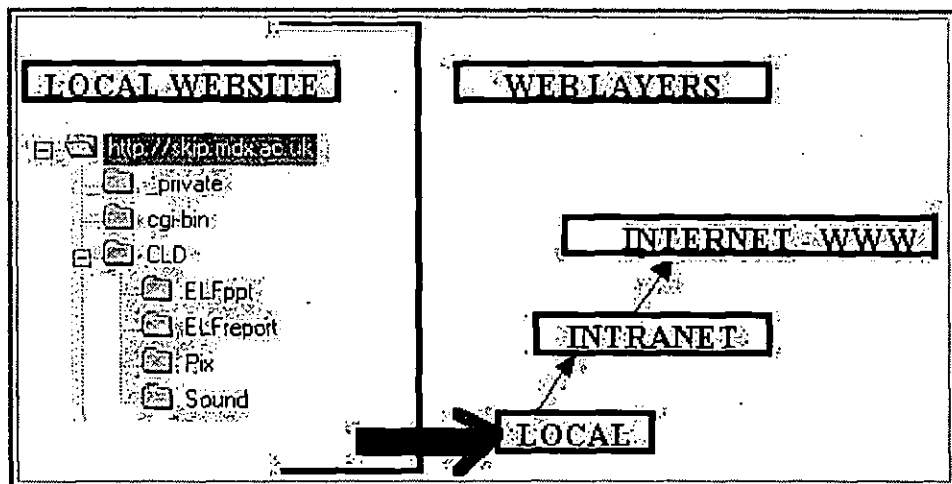


Figure 2.36

Expanding layers of information on the web

This section is leading towards a learning model developed and adapted for the web by this research. Since this concept is still in the developmental stages it is not yet ready for presentation in this dissertation.

2.4 Summary Discussion

Educational theories can be distinguished by their positions concerning epistemology and learning theory. A theory of education is generated by embracing some view of what it is people learn, as well as a position on how they learn (Hein, 1996). The realist attempt to find the "true structure" of the subject of knowledge while the idealist seek to understand the learner's constructed meanings [2.18]. A fundamental feature in learning theory is to define the student's role in the learning process as active or passive. Behaviourist see the student as passively adding incremental units of information to create knowledge. A more active view of the learner sees meaning being constructed in the student's mind through rich, interactive experiences. There are several models to represent the relationship between the learning and teaching [2.18]. The lecture is the most basic system.



Figure 2.40a Passive learning

Hein [2.18] sees teaching as only one element in the process of learning. The learner's initial motivation and interest is key to the learning process. The physical location (i.e. - classroom, library, etc.) and cultural location (i.e. - Western Europe, Arab countries, Asian countries, etc.) must also be factored into the equation. The individual's prior knowledge and experience must also be considered. The aim of education is to balance appropriately the influence of each factor that influences learning and to find the correct contribution of each to reaching the goal. This can be expressed symbolically as the formula in Figure 2.40b.

$$\text{Learning} = \Sigma [\tau(\text{teaching}) * \varepsilon(\text{experience}) * \beta(\text{environment}) * \kappa(\text{culture}) * \delta(\text{interest})]$$

Figure 2.40b Hein's learning formula

This illustration, Figure 2.41, inverts the process to start with the core elements. Here the separate elements meet in the learning experience of the student.

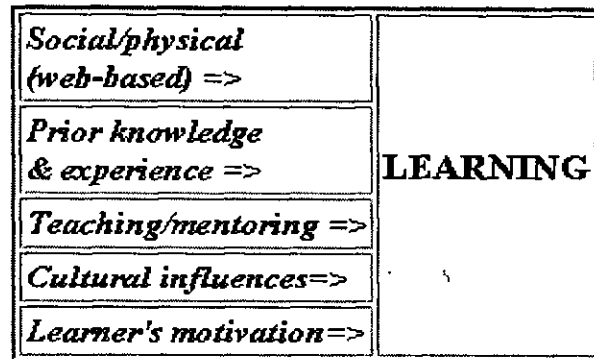


Figure 2.41
Elements composing a learning
experience

2.41 Adaptation to the web

This research shows that by applying the Constructivist Learning Theory principles, detailed earlier in the chapter, to the design process for creating a web-based learning environment it is possible to create a virtual seminar setting for the student. The figure below (figure 2.42) starts with a *live* classroom setting and the principles that guide the learning process. The next stage is the adaptation of these principles to form Web-Constructivism and the Spiral Learning Model (chapter 7). The final step is the development of the protocols used in this web-based environment guided by the feedback gained through applied formative evaluation methods that are discussed in the next chapter.

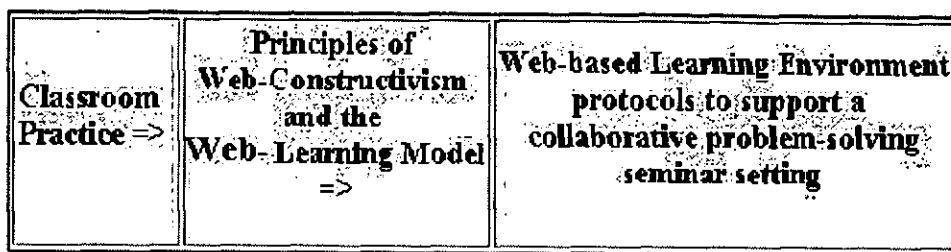


Figure 2.42

The process of adapting real-world practices to a web-based learning environment

Web-Constructivism or Constructivist learning principles presented via the web, has its roots in the real world but takes life in the virtual world. It can be defined as a set of guidelines aimed at assisting the learning environment designer (LED) in simulating the characteristics of a live Constructivist learning experience. Thus, Web-Constructivism is the adaptation of the appropriate principles (from Appendix A) which can be mapped onto the protocols (presented in the next chapter) to support a web-based learning environment.

Table 2.21 highlights the strengths and weaknesses of Web-Constructivism. Since the web is a relatively new learning environment this report recognises the limitations it can offer in the field of educational technology in the way of presenting a newly adapted learning theory. Web-Constructivism will not be the answer to all types of subject matter or all types of delivery methods (teaching strategy) [part 1 of table 2.21] and, as with all learning, the student must be at a point of readiness which supports the learning process. It is further recognised how this approach does not easily conform to the traditional teaching and assessment methods employed by many learning institutions [part 7 of table 2.21]. In light of the virtual university losing its ivy covered walls to a non-geographically defined learning space, perhaps too, Web-Constructivism can introduce a new paradigm for the learner.

2.5 Summary - Development of Web-constructivism

This summary discussion examines the development process of Web-constructivism through a critical interpretation of the principles presented in the past chapter (see table 2.20 , 2.21 as cross-referenced by the authors of Constructivist principles in Appendix A). It is the appropriate adaptation and application of constructivist learning principles to the web-based learning environment which constitute Web-constructivism. Due to time constraints, not all of the principles presented in Appendix A are analysed. Table 2.20 illustrates the Web-constructivist principles which map onto the protocols suggested by this thesis. These are illustrated by the on-line features / tools of the DELBERT learning system (table 1.10 & 1.11).

In review, the eight Constructivist principles developed into Web-constructivism in this study are:

- | | |
|---------------------------------|--|
| 1) <i>Problem-solving start</i> | 5) <i>Reflection</i> |
| 2) <i>Prior knowledge</i> | 6) <i>Collaboration</i> |
| 3) <i>Epistemology</i> | 7) <i>Student-centred:
teacher as mentor</i> |
| 4) <i>Active learning</i> | 8) <i>Norm referenced assessment</i> |

Since table 2.21 reveals the strengths and weaknesses of these principles, this summary offers a methodology to convert and develop the weakness into a strength.

Problem-solving start

It is true that this research is not stating that the proposed DELBERT learning system is appropriate for *all* content types and *all* levels of cognitive skills in a given task. Nor does it suggest that by simply providing content presentation in a multimedia format that comprehension is guaranteed. However, as Papert et al., suggests (section 3.1), there is a transition to autonomy. A system design to support student learning is proposed in the "Transitional Autonomy Model" (TAM) learning system (Basiel, A. 2000). In this way Bruner's spiral curriculum organisation (Appendix A) is applied to the

development of Web-constructivism. For this principle the learner is guided from the concrete-to-abstract paradigm (section 3.1).

Prior knowledge, epistemology and norm referenced assessment

A teacher in a live class room or an on-line learning system can not readily anticipate a student's prior knowledge going into an educational experience. This personal knowledge building and acquisition process is not easily measured. Although using the DELBERT learning system the process text exchanges can be recorded. For this reason, this research supports the use of Norm referenced assessment (peer review) as opposed to Criteria referenced assessment (standardised tests) (Biggs, J. 1982) (table 2.21). As Merrill (1991) encourages (Appendix A) this testing process should be integrated with the task, not a separate process. To see this development through would require the (virtual) university to adopt a Web-constructivist approach to assessment. This issue is not the focus of this report but could be developed by measuring the difference between a pre-test and post-test of the student. This study is more concerned with the formative evaluation methodology discussed in the next chapter.

Active learning, collaboration and reflection

The on-line DELBERT learning system student is encouraged to be an active participant by collaborating via web-based communication tools (chapter 4) and reflecting on the exchanges. These interactions are supported by the applied formative evaluation methodologies developed in this research (chapter 3). On-line surveys and interview tools (chapter 4) collect data to provide evidence (appendix D,E,F,G) to support the collaborative construction of knowledge through the social organisation that Jonasson (appendix A) requires of Web-constructivism. The on-line teacher must also take an active role as discussed in the next section.

Student-centred: teacher as mentor

Classroom teachers may have difficulty adapting to a constructivist model where it is the student steering the learning process and they are not seen as experts of the knowledge domain. To complicate matters, Web-constructivism applies this new teacher-as-mentor identity to a web-based content presentation and communication medium. The Web-constructivist teacher is now moderating the student's learning experience through such on-line tools as text chat, e-mail and desk-top video conferencing (Chapt. 4).

CHAPTER 3: PROTOCOLS FOR APPLIED FORMATIVE EVALUATION METHODS

Objectives of the chapter -

This chapter discusses the protocols developed in this research for a collaborative problem-solving seminar and how they relate to applied formative evaluation methodologies. The reader should be able to:

- Identify types of knowledge.
- Identify types of learning environments.
- Identify teaching/learning methodologies.
- Understand the seminar protocol used in this study.
- Understand the guidelines for recreating an on-line seminar.
- Understand evaluation strategies.
- Understand the relationship of evaluation to the web-based design cycle.
- Understand applied formative evaluation in a web-based environment.

Section 1: Protocols

3.0 In Brief

The goal of this chapter is to produce a set of rules to guide communication in a web-based learning environment. These rules serve to aid the learning environment designer (LED) and subject expert (SE) / tutor in the creation and development of a web-based learning space.

First, the various threads composing this setting are examined. As with the previous chapter, the approach taken here will be to initially explore classroom (real-world) situations. Next, by applying these proven (successful) practices to a web-based environment a set of protocols can be established for the web-based learning (WBL) environment. This learning space is composed of several interwoven threads:

- type of content or subject matter
- presentation style for this information
- the student's learning style

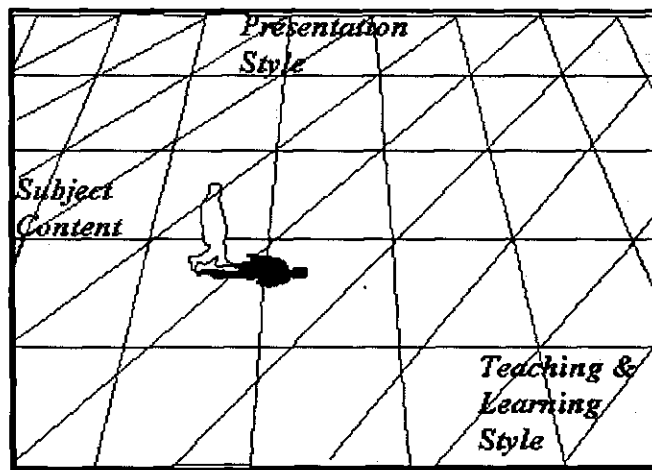


Figure 3.00 elements of the WBL

3.1 Types of Knowledge

The three types of knowledge discussed in this research are propositional, procedural and abstract (Papert 1980 & 93, Bloom 1956, Piaget 1950, Bruner 1966). Propositional knowledge is fact-based (concrete). This is rote, low-level information. An example to illustrate this type of knowledge is a simple list of vocabulary terms. Procedural knowledge is skill-based. This middle-level information is sequential or step-by-step in nature. An example to illustrate this knowledge type is seen in the directions followed (user manual) to install some software into a computer. Problem-solving knowledge is abstract. This higher-level information may include cognitive skills such as classifying, analysing, predicting or creating (Brooks 1993). A basic teaching rule to follow towards conceptual development is to use the concrete-to-abstract paradigm (Piaget 1950).

KNOWLEDGE TYPE	<i>Propositional</i>	<i>Procedural</i>	<i>Abstract</i>
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Table 3.10
Three knowledge types

3.2 Types of Learning Environments

The three main types of settings in which the student can learn addressed by this study are lecture, labs and seminars. The traditional lecture style sees the teacher as the sage-on-the-stage (Cochrane 1996). In this environment there is a one-way transmission of information from the (active) teacher to the (passive) student (Hein 1995). This learning environment is low in interactivity. The lab setting still has the teacher as the one responsible for directing the student's experience through the learning process. The student goes through a sequence of steps to accomplish the goal. This setting tends to be more hands-on and therefore more interactive in its approach. The seminar takes a problem-solving approach. In this setting the instructor guides the

group through discussion to solve a particular task. The teacher's role may vary in the degree of involvement from high (controlling the exchanges) to low (passively observing the conversation).

LEARNING ENVIRONMENT	<i>Lecture</i>	<i>Laboratory</i>	<i>Seminar</i> <i>Problem-solving</i>
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Table 3.20
Three type of possible learning

3.3 Learning and Teaching Methods

This research is concerned with three types of learning/teaching styles linear, guided and discovery. A Behaviourist approach (see Chapter 2) appeals to learners that prefer information presented in a linear fashion from simple to more complex in nature. This student needs an incremental delivery style (Hein 1995, Skinner 1968). A guided learning style uses scaffolding (Boyle 1997, Skinner 1968). The teacher's role is to act as a mentor or guide. Information is introduced only as needed (through the teacher's point of view). A non-linear system is used to present content. The student's role is more active compared to a lecture. Papert (1980) endorses a discovery approach. Here the student is allowed to explore the content in an unrestricted manner. This non-linear style of perusing the material allows the student the greatest freedom and opportunity to take an active role (Papert 1980).

LEARNING & TEACHING METHODS	<i>Linear</i>	<i>Guided</i>	<i>Discovery</i>
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Table 3.30 Three teaching methods

Instructional situations, according to Bruner (1966), need to be rooted in the real world. He supports the concrete-to-abstract paradigm but suggests the

terms enactive-ikonic-symbolic to describe the sequences of conceptual attainment. The enactive stage is the concrete situation that the students find themselves in when they already know what to do. They have been in the situation before and successfully resolved it. An ikonic representation is where the context of the problem can be mapped in a figurative or diagrammatic fashion (Biggs 1982). A symbolic situation deals with the unknown. The student must form an abstract representation to conceptualise a theoretical solution. These steps can be illustrated by the student responding to a problem by writing a text solution, drawing a flow chart to visualise an answer or writing a short-hand set of symbols to represent the result (Biggs 1982).

Studies in learning and recall done by the British Audio Society and the Gartner Group (1990) support a pro-active student position (Basiel 1995). The highest percentage of retention occurs when the student is most actively involved with seeing, hearing, saying and doing. In Table 3.31 XX% indicates that the survey was not conducted in that medium.

Input Medium	BAS %	Gartner %
READ (only)	10%	XX%
HEAR (only)	20%	XX%
SEE (only)	30%	20%
SEE & HEAR	50%	40%
SAY	70%	XX%
DO (Constructivism)	80%	90%

Table 3.31 learning and recall modality

KNOWLEDGE TYPE	<i>Propositional</i>	<i>Procedural</i>	<i>Abstract</i>
LEARNING ENVIRONMENT	<i>Lecture</i>	<i>Laboratory</i>	<i>Seminar Problem-solving</i>
LEARNING & TEACHING METHODS	<i>Linear</i>	<i>Guided</i>	<i>Discovery</i>

Table 3.32 Matrix of optimal learning

This table summarises the qualities of a real-life learning environment discussed so far. These attributes are adapted to a web-based setting later in the chapter.

As table 3.32 highlights, the last column contains the characteristics of a higher-level learning situation: a discovery problem-solving seminar discussing abstract knowledge. The next section of this chapter focuses on a seminar that allows the student to solve higher cognitive problems through a discovery approach.

3.4 The Seminar Approach

A seminar, as defined by the Oxford dictionary (1997), is a small class at a university for discussion and research. A group interview or focus group is a variation of this learning environment used in research (Mason 1988 & 96, Cohen & Manion 1994). This section of the chapter will examine the seminar learning environment in two parts; the Activity theory and communication protocols.

3.4.1 Vygotsky's Activity Theory

Vygotsky (1962) believed that conflict inspired collective learning in his Activity theory (Vygotsky 1962) [2.0]. Bruner (1985) supported this position, "There is no way, none, in which a human being could possibly master the world without the aid and assistance of others for, in fact, the world is others."

Most learning theories ignore this social dimension, which must not be omitted (Davies 1960).

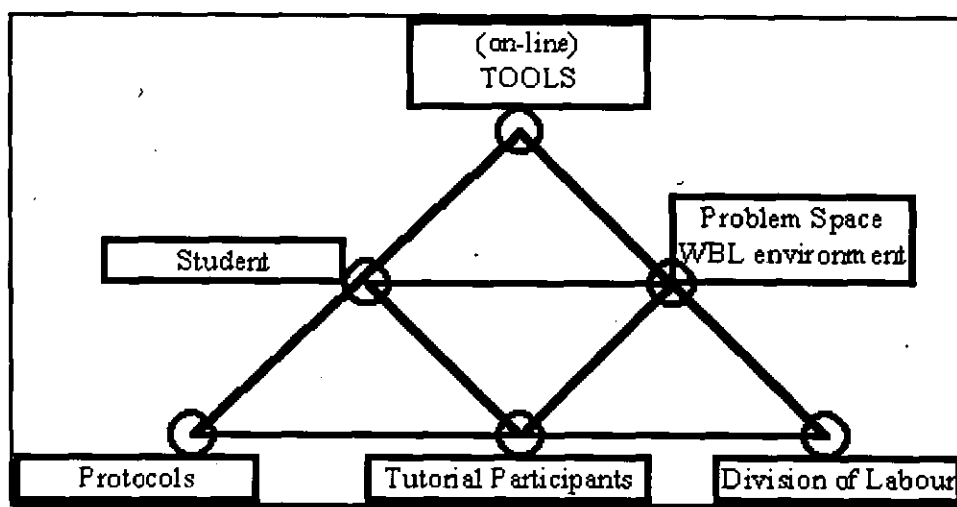


Figure 3.40 Vygotsky's Activity Theory

Human activity is viewed as an independent system involving the student (or subject), tools (or on-line tools), learning environment, a problem space (the lesson objective), the divisions of labour between community members, and the conventions (rules or protocols) regarding actions [3.1].

This model demonstrates that the activity of the individual (top three components) is not viewed in isolation, but tied together to the larger cultural context. Human activity is socially bound and not simply the sum of individual actions. The system as a whole is dynamic and continually evolving (like the web). Thus, this model provides a composite view that recognises both the socially distributed nature of human activity and the transformative nature of activity systems in general (Hewitt 1998[3.2]).

Communication Protocol:

Within the seminar problem-solving environment the participants must interact to reach a resolution. They must discuss, collaborate, debate and argue

as part of this communication process. This confrontation approach includes the general elements of commitment, challenges - responses, predicament - punch-line and resolution. For the purpose of this research then, protocols are looked upon as the sequence of display and response elements in a learning environment or system that are interactive and/or adaptive. The seminar protocols guide the discussion to help the students arrive at a conclusion for the problem (Jackson 1997).

The Masur protocol follows these stages (Aakhaus 1996):

1. state the problem
2. silent individual reflection
3. commitment to an answer
4. arguementation
5. revision / reaffirmation

This sequence of steps guides the student through a seminar, problem-solving, learning scenario. To begin with, a problem is introduced. Next, the student thinks alone about the task. A conclusion is drawn, based upon prior experience and knowledge. This solution is then presented to the group members for arguementation. The presenter defends their answer and attempts to pressure others to agree with their point of view. After listening to counterpoints the student decides to maintain their stance or adapt it based on input from others in the group. A final solution is then confirmed.

One-Minute Essay

A variation on this system is to construct a one-minute essay. The same protocol is followed with the restriction added that there is only one minute to prepare the argument. The intent of this methodology is to force the student to prepare a clear, concise presentation of the conclusion with minimal explanation or verbiage. The response to the presentation from the tutor (or tutorial system) can vary. After the one-minute essay the student may need to

answer specific questions in the form of a test, produce some course work, create an application, engage in discussion or defend a peer review (Jackson 1997).

Expert/Model Answer

Another variation on the Masur protocol adds the submission of a possible solution by an expert (Jackson 1997). This added step presents the student with a model answer devised by the subject expert / tutor. It is not intended to be the only correct solution, but to guide the learner to knowledge they may not have yet encountered. This research supports the addition of this step to the original Masur protocol:

1. examine the model solution submitted by the subject expert / tutor
2. individually reflect
3. research the new information in relation to previous conclusion
4. reassess / reaffirm the new conclusion

3.5 Adaptation for the Web-Based Learning Environment

Through the use of web-based technologies such as HTML forms, e-mail, Javascript and video conferencing it is now possible to conduct a virtual collaborative problem-solving seminar. But, as with the classroom setting, a set of communication protocols are needed to guide the interaction. This section of the chapter focuses on the web-based learning environment and the rules / protocols to aid the (LED) learning environment designer.

This discussion will begin from a broad examination of the issue and work down to a specific case study conducted for this research. The pilot project, DELBERT (Digital Environment Learning-Based Evaluation Response Theory) Tutorial System [3.3] will be reviewed in chapter 6.

This research has established a set of general rules to start any web-based tutorial system:

- It must be on-line (viewed through an HTML browser)
- It is student-centred
- It uses appropriate on-line tools and resources (based on content and student's needs) This is detailed in chapter 4 of this report.
- These on-tools (i.e.: e-mail surveys, HTML forms...) are unobtrusively embedded throughout the tutorial
- Timeliness of feedback responses need to be considered
- The design is template based

The content of any web-based tutorial system must be written in an HTML format.

Included within this is any multimedia file which can be called into a page or reside within the tags. This research does not support the use of any multimedia requiring a special plug-in. The use of graphics (.gifs, .jpg), animated .gifs, sound (.wav, .midi) and Javascript are supported in this study.

The web-based tutorial system must be on-line (viewed through an HTML browser).

It is this on-line quality which allows two important features of a tutorial system: the ability to communicate a/synchronously with other participants (and the tutor / LED) and the ability to adapt the content of the tutorial system based on feedback gained through formative evaluation techniques developed in this study (chapter 3).

A hybrid of on-line and CD ROM technology is acceptable within these guidelines. In this case large, time consuming files (e.g. – animated .gifs, sound files or large graphics) can be stored locally on the CD while text and information which needs to be updated on a regular basis can be stored remotely.

It is student-centred

The environment should meet the needs of the student, not the teacher. The content should facilitate and empower the student to arrive at their own solution (which may not be the tutor's answer). Therefore the presentation of the content should allow the student to form their own navigation path. Each individual should construct their way to their own conclusions. The learning process should not be pre-set by the teacher, but student defined. It uses appropriate on-line tools and resources (based on content and student's needs). A variety of on-line tools and resources should be made available to the student to aid them in their knowledge journey. Introductory content should be easily accessible. This may take the form of the starting problem composed of text and/or supporting graphics. On-line tools for communication (e-mail, video conferencing, search engines) should assist the student in their research action.

These tools are unobtrusively embedded throughout the tutorial.

The design of the tutorial should be such that the student can access these tools from any point in the tutorial. A maximum 3 click rule is recommended as a test. It should not take more than three clicks to reach tutorial content, an e-mail window, a web search engine or a video conference window [3.5].

Formative evaluation feedback tools (chapter 4) are aimed at supplying information to the subject expert and LED. These may be HTML forms, e-mails or video conferences. The placement of these tools in the tutorial system also require a set of guidelines:

1. Formative evaluation tools need to be placed immediately after the introduction of a major block of content.
2. The feedback tool needs to give the student the ability of a mixed response. (i.e. - closed: Likert scale and open: essay text)
3. Reflective feedback needs to be gained after the tutorial is complete.

4. A checks-and-balance of feedback methods is needed. Surveys should cross reference with the data collected from interviews.

Feedback responses need to be considered.

The timeliness of a response needs to be considered when the feedback is analysed. The student's feedback may differ from an immediate opportunity compared to a retrospective impression conveyed over time.

The design is template based

With the use of a template (generic) approach the tutorial system is not content driven. It is the method of presenting the information and the communication environment that drives the pedagogy. Because of this approach any subject matter can be inserted into the tutorial system. It is true that higher order problem-solving issues are better suited to this design versus rote facts. However, as results from the case studies indicate (chapter 6), this tutorial system has been successfully tested in the area of Philosophy and British Teacher Education.

Davies (1997 [3.4]) offers some key points in his Learning Network Design (LND) approach to constructing co-operative distance learning environments:

- 1) Methodology as generic:

Problems are often generic, but solutions are generally local. LND therefore, is a methodology rather than a method. "By methodology I do not mean method...my sense of the word here is that the outcome of the research is not a method but a set of principles of method which in any particular situation have to be reduced to a method uniquely suitable to that particular situation." (Checkland 1979).

- 2) Focus on providing solutions for learning in co-operative situations to

enable the process of learning in groups.

3) Scalable:

The tutorial system can handle a pair (tutor and student) or the organisational complexity of a major training provider with a large student population.

4) Simple and structured:

The tutorial system should consist of few elements which makes it easily used by the students and course providers.

Kilby [3.6] suggests these rules for good web-based training design:

- 1) Establish a formal development process that is best suited for the product.
- 2) Choose media types based on learning objectives.
- 3) Provide ample opportunity for the user to interact with the information. Clever instructional design forces the user to roll and tumble an idea in their mind, an effective method of mental interaction not requiring an oral or motor response. This web design rule supports Web-Constructivism.
- 4) Design products (learning environments) that adapt to the user's ability and intelligently responds to the user's input.
- 5) Provide meaningful feedback to user input that reinforces a concept and hardens the foundation for further learning.
- 6) Users learn through a variety of styles. Information presentation should vary accordingly.
- 7) Reject linear thinking; abandon linear design. A highly structured, top down approach to instructional design does not address the needs and preferences of most trainees. The user decides the direction best suited for accomplishing their goal: to learn. It is acceptable to suggest a path through the course. Another test of the tutorial system should allow the user to begin in the middle and end at the start (Kilby 1998).

- 8) Respect the learner. Avoid any content or feedback that is instructionally insignificant, annoying or degrading.
- 9) Be aware of different reading rates:
People read at different speeds. Do not display information which automatically disappears after a short period of time.
- 10) Avoid long down-load times. Make files in several small groups as opposed to one large document. This is helpful for printing the document as well.
- 11) Test the tutorial system with experts and actual users. The developers maxim is: *test early, test often* can be adapted in this study to say: *test throughout the experience and test continuously*. Test in the context of this research means to receive and process participant feedback.

The following protocols are specific to the DELBERT Tutorial system (chapter 5) which is the case study software used to illustrate the principles and protocols that are adapted and developed in this research. The student and tutor need to have a clear job description going into the learning experience within the web-based learning environment. It is important that each knows what they can expect from the other. According to this research the web-based tutorial system should provide the student with:

- 1) the course work assignment.
- 2) necessary related information.
- 3) and/or on-line resources to access relevant data.
- 4) communication tools for all participants (subject experts and peers).
- 5) the tutorial system itself should act as a tool to aid the student through the learning process.

This study supports the assumption that the tutor / subject expert has a set of expectations about the students response to the content and the tutorial. The student needs to:

1. clearly understand the goal (start problem and learning objectives) of

that specific tutorial lesson.

2. clearly understand the related background information.
3. reflect on prior knowledge and experience.
4. devise a web-based research plan.
5. collect and organise textual and graphical material.
6. reflect on the new information.
7. compose a well structured argument (introduce the concept, show supportive documentation, present conclusions).

The following check list is a contribution made by this investigation for the LED to create a DELBERT Tutorial system:

- __1. The starting problem and subject expert model answer must have accompanying background material.
- __2. After every major content item a feedback opportunity is given via appropriate on-line tool(s).
- __3. Web resources should include at least one of each item
 - ☐ pre-selected links by the subject expert
 - ☐ on-line archives, glossary, dictionaries, libraries, museums, etc.
 - ☐ e-mail link(s) to subject experts
 - ☐ a variety of keyword or meta search engines
 - ☐ a place to post student entered links
- __4. Students have an opportunity to actively contribute to the content of the tutorial (i.e. - DELBERT Active Pages)
- __5. Any active entry submission or draft solution must follow this set of protocols:
 - ☐ a method to identify the contributor (unless an agreed alias is used before hand)

- ☐ clear, concise wording of textual content
 - ☐ bibliography of data submitted should include: author, title, publisher/URL, date last accessed
- __6. Feedback specifications must consider these issues:
- ☐ survey using mixed methods (fixed Likert scale and open response)
 - ☐ interview (i.e.- video conference with text chat)
 - ☐ immediate timeliness (after content presentation)
 - ☐ reflective timeliness (after course completion)
- __7. The Help system needs to appeal to various learning styles:
- ☐ text description
 - ☐ graphical representation (i.e. - interactive site map)
 - ☐ mentor help (*) see description

(*) Mentor Help is the *active* help system developed in the DELBERT Tutorial system [3.6]. Students successfully completing the lesson submit their e-mail links to the mentor help page via an HTML form. This added resource allows the participant to contact the mentor help student for peer assistance, feedback and review.

Norman (1997)[3.6], states that there are thousands of courses appearing on the web [3.7]. The design approach has been a bottom-up, materials driven development. Given the course materials, the question is how to get them onto the web and accessible by the students quickly. Organisation of the material is approached as an after thought. This research offers a methodology to fill the gap in existing *distance learning shells*. World wide web courseware shells should contain:

- ☒ A home screen (entry point or navigational hub)
 - that should provide opening material and menu
- ☒ A syllabus (index of lessons by date)

- which should provide lecture topics, readings, assignments, quizzes...

☒ Lecture material (linear series of screens starting with an index)

☒ Embedded tools (simulations, spreadsheets, calculators...)

☒ Note taking and annotation (software to write notes and store images for record keeping)

☒ Major exams (separate from tutorial system)

- scheduled and controlled mixed format assessment such as multiple choice, short answer, essay or mixed.

☒ Quizzes / Self-assessment (embedded within the tutorial)

- feedback opportunity on short term comprehension of material

☒ Homework (reading, assignments, projects completed on a scheduled basis)

☒ Seating Chart / Class Roll (class list of students by home webpage including picture and biographical information, and geographical location)

☒ Collaborative Projects (shared workspace for groups)

- This is a key element of the DELBERT Tutorial system

☒ Chat and Discussion (discussion lists integrated into the course structure)

☒ Messages / E-mail (individual and distributed lists to communicate via text and attached media files)

☒ Feedback questions and course evaluation appear in the form of mandatory feedback buttons after each lecture screen. The student is required to give input or they can not progress. This needs to be built into the schedule of the course.

The following table lists some web-based learning shell systems (Norman 1997/ Basiel 1995):

Web-based learning shells:	examples as - http://
<i>WebCT: U. of British Columbia</i>	homebrew.cs.ubc.ca/webct/
<i>RealEducation</i>	realeducation.com/
<i>Chalk by the Interactive Factory</i>	www.chalk.com/
<i>WebCourse in a Box</i>	madduck.mmd.vcu.edu/wcb/
<i>TopClass from WBT Systems</i>	www.websystems.com/
<i>DELBERT Tutorial Systems</i>	skip.mdx.ac.uk/DELBERT/
<i>POLIS- University of Arizona</i>	www.u.arizona.edu/ic/polis/
<i>Integrated Application Features (see Appendix B)</i>	www.ctt.bc.ca/landonline/choices.htm
<i>Uminfo-Web Tools Evaluation</i>	www.umanitoba.ca/iip/tools/courseware/evalmain.html
Table 3.51 Current WWW learning shells	

3.6 SECTION 1: Summary Discussion

The web, just like a live classroom, can house various types of knowledge from simple facts to abstract cognitive data. The setting that contains this content may also vary from a simple lecture to a highly interactive discussion group. The methodology employed to present information can also vary in complexity from a simple linear design to an open discovery approach. This research supports a problem-solving seminar learning environment guided by a set of web-based communication protocols. These protocols, patterned from real-life, aid the web-based learning environment designer (LED) by providing guidelines that support the Web-Constructivist learning theory introduced in the last chapter.

Table 3.6 below points out the strengths and weaknesses of the protocol presented in this research. This critical analysis is intended to support this study's position to continue from the pilot case studies to develop the protocols in the full case study.

Table 3.60 Critical Analysis of Protocols		
COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	PROTOCOL STRENGTHS	PROTOCOL WEAKNESSES
[1] START PROBLEM & RELATED BACKGROUND CONTENT	<i>Using this protocol allows the content to be open to any subject. Therefore it can be adapted for use in many disciplines.</i>	<i>If the lesson information is procedural (i.e. – a sequence of skills to learn) it is not easily adapted to a problem-solving task for the assignment.</i>
[2] DRAW ON PRIOR KNOWLEDGE & EXPERIENCE	<i>The student associates the problem/task with any similar experience or knowledge to link old solutions to new ones.</i>	<i>If the student is a virgin to the subject matter they will have no prior knowledge or experience to draw upon.</i>
[3] DEVISE AND IMPLEMENT A RESEARCH STRATEGY	<i>Since guided discovery (Papert 1993) is used each student can form their own method to research the answer.</i>	<i>A student new to a field of study or technology may not have enough experience to form an effective research plan.</i>
[4] FORM AN INITIAL CONCLUSION TO THE PROBLEM TO ARGUE WITH PEERS	<i>Since this answer is only a first draft the actual content of the argument is seen as equally important as the strength of the narrative. How the solution is presented is part of the learning process.</i>	<i>Students lacking in confidence in their mastery of the subject matter or their presentation skills will be hesitant to openly participate in debate on the problem-solving task.</i>
[5] COMPARE SOLUTION TO A SAMPLE (EXPERT) ANSWER AND ARGUE TO FORM A REVISED / REAFFIRMED CONCLUSION	<i>Dr. Mason, the case study tutor, states that a strength of this system is that plagiarism becomes difficult for the student since they must write two essays in the same style for evaluation by peers and the tutor.</i>	<i>A major problem seen with this system is highlighted in this point. What is to stop the student from simply jumping straight to this stage and agreeing with the expert? This will not support learning.</i>

Table 3.60 Critical Analysis of Protocols, cont.

COLLABORATIVE PROBLEM-SOLVING PROTOCOLS	PROTOCOL STRENGTHS	PROTOCOL WEAKNESSES
[6] BASED ON FEEDBACK GAINED THROUGH APPLIED FORMATIVE EVALUATION METHODS THE TUTOR AND LEARNING ENVIRONMENT DESIGNER (LED) REPLY TO STUDENT QUERIES AND/OR POST CHANGES TO THE TUTORIAL CONTENT OR METHOD OF DELIVERY	<i>The use of applied formative evaluation techniques takes full advantage of the flexible nature of the web. When feedback is processed by the tutor/system it is a fairly simple matter to update and modify the tutorial content or presentation format.</i>	<i>Since this research has only been done as a pilot study there is no conclusive evidence yet to suggest that this system will hold up to a mass learning situation. The methodologies or the on-line communication technologies need to be fully tested to determine if they are robust enough for a large student- teacher ratio.</i>
[7] THE STUDENT COMPARES THEIR SOLUTION TO THEIR PEERS AND AN EXPERT EXAMPLE TO EVALUATE THE AMOUNT OF IMPROVEMENT MADE FROM THE FIRST TO THE SECOND SUBMISSION	<i>Assessment reinforces the learning experience. Evaluation is seen as an on-going process. In this way the student can gauge the rate and type of improvement that occurs in the lesson relative to peers, not a standardised scale (Biggs 1982).</i>	<i>Peer review must still be compared to an expert assessment (e.g. – Middlesex University policy). So in that sense it is an added, unnecessary step which creates additional work for the tutor, not less administrative problems.</i>

Section 2: Applied Formative Evaluation Methods

3.7 Evaluation Strategies

*"The difficulty is in establishing a testing methodology for
distance learning, because it is more art than science."*

(Stufflebeam and Webster 1980)

This opening statement is a reminder that educational technology is a merger of two schools or disciplines. Education has developed evaluation

methodologies over time that can be applied to a technological setting. This section demonstrates the process of adapting real-world (classroom) strategies to a web-based environment.

Evaluation typically concerns one of these main topics (Mason 1996):

- gain background data such as student's name, age, etc.
- record an opinion which will produce a statistical result
- record response time, amount, etc.
- measure pre- and post-knowledge
- establish cost effectiveness

Evaluation methods can be used to produce a user profile. This may be valuable in interpreting other types of information gained such as the student's attitudes or impressions. Quantitative information can be produced by measuring factors such as time on task, number of hits to a URL (a.k.a. a hit counter [6.1]), and other devices. Macromedia [6.2] has produced a powerful system (Attain Enterprise Learning System) to compile quantitative statistics for employee training and educational purposes. Evaluation techniques may also be used to produce results for a summative assessment (i.e. - multiple choice, short answer, matching or essay exams) as illustrated with Javascript in section 4.3. Or evaluation tools can also be used to produce data demonstrating the budget of a project.

Distance learning and telecommunications place the focus on other aspects of evaluation (Mason 1996):

- flexibility (ability to use the system at any time or place)
- security
- compile results easily
- customisation of learning environment

Through the use of on-line tools discussed in chapter 4 the student has the flexibility to communicate with the subject expert or learning environment designer (LED) at any time. They are no longer restricted to visit only during office hours.

There are two sub-topics concerning the security of any evaluation methodology. Some computer mediated conferencing (CMC) systems allow the student to enter input with the ability to remain anonymous. Chapter 5 of this report describes the software developed for the case study, the DELBERT Tutorial system, which uses a CMC system. Depending on the protocol the student may have the ability to use an alias. Data authenticity is another issue for verification of user login. This circumstance may arise during an on-line exam where student identity comes into play. Javascript (section 4.3) can be used to create a password entry and a user-personal-name for the HTML page.

Once the data has been received from the student it needs to be processed. There is a variety of software that will compile user input and represent it in a statistical or graphical format (see chapter 4). Javascript may also be used to present an on-line, graphical representation of e-mail surveys (section 4.3).

Giving the student the ability to customise the learning environment to meet their needs must be supported by the evaluation tools and methodologies. This is part of the Web-Constructivist approach discussed in Chapter 2. The DELBERT Tutorial system illustrates this by allowing the student to add new information they discover in their research to the content of the lesson by directly submitting it via an HTML form (section 4.2).

The two main areas this discussion addresses are the evaluation techniques used and the nature of the measurement results. Another important area of

evaluation methodology concerns the follow-up or action taken with the results of the evaluation. Since this was discussed in Chapter 4.3 it will not be a focus of this chapter.

This research examines several evaluation strategies such as summative, illuminative and integrative techniques. Formative evaluation as applied to a web-based learning environment is the paradigm this study supports. Many quantitative research projects have been conducted to examine computer based training (CBT) and computer mediated conferencing (Collis 1991 and Mason 1996). This research methodology focuses on the qualitative (as supported by the quantitative) feedback gained through the formative evaluation methods developed in this study.

Action without feedback is unproductive for the learner. Making the right connection between action and feedback constitutes learning. (Laurillard 1994)

There are two main types of feedback. Intrinsic feedback is a natural consequence of action. (i.e.- filling, pouring...) Extrinsic feedback is a right / wrong or approval / disapproval response to the user. The four main parts of the action-feedback-cycle are (Laurillard, 1994):

1. Discursive
2. Adaptive
3. Interactive
4. Reflective

Discursive:

Teacher and student concepts need to be accessible to one another. They must both agree on learning goals for topics and tasks. The teacher / tutorial

provides an environment where the student can act, generate and receive feedback. There should be a structured map of the content to allow access at any time to all aspects of the teacher's description of the concept. This may be done in several ways. The student can access pre-made audio / video material (canned text). Multiple choice questions with keyword analysis to allow student expression could contain an algorithm to interpret student descriptions. The tutorial should avoid navigational problems with moving ahead or backtracking. The student should never have to wonder, "How long will this take?" or waste time attempting to guess the word the programs wants.

Adaptive:

This refers to decisions based on student response on which path of teaching the student needs. Here the teacher/system determines the focus of the dialogue. There is a link between goals and student description. Students need the ability to control their own sequence by selecting or constructing the task goal. This gives them the feeling of constructing their own experience, a Web-Constructivist principle (chapter 2).

Interactive:

Students need to act to achieve goals that must be clear so it is apparent when they are achieved. An algorithm could be used to generate specific task types. Extrinsic feedback is used to guide the user. Intrinsic feedback needs to be meaningful in a help feature (chapter 5). This is illustrated in the dynamic AI help system proposed in section 7.2 of this report.

Reflective:

The teacher / tutorial decides how, based on the students response, to change the description to better suit the student's needs. There must be an indication

of the amount of material in each section to allow for self-pacing. The DELBERT Tutorial system does this in a simple fashion by posting on each chapter topic a prompt by the navigation bar (i.e. page n of n - see chapter 5). Allowances are set up for testing and evaluation. A predetermined questioning strategy must be made so the teacher can interpret the response. From this extrinsic feedback is given. This will form the recommendation given to the student for further navigation through the tutorial. Learning is a constructive, building process of meaning making. This is done through reflective abstraction which produce symbols within a medium. These symbols become part of an individual's repertoire of assimilated schemes known as the Schema theory (Laurillard 1994).

3.8 Evaluation Paradigms and the Web-based Design Cycle

There are several reasons to do evaluations. From the practical perspective, for example, it can help to justify expenditures. If a project is funded it will help with public relations. From the research perspective, it helps guide the design process. Formative suggestions influence the outcome of the project. In the context of evaluation these questions must be considered:

1) Who will pay attention to the evaluation?

Some funded projects must produce a report for a committee. In the case of this research the evaluation results, or feedback, will go to the design team comprised of the subject expert and the learning environment designer (LED).

2) What will happen to the results?

Will the student's input from the tutorial system be acted upon or just filed away? Evaluation of educational interaction should be looked upon as a construction of knowledge, rather than a discovery of knowledge. The student's feedback acts as a formative guide to (re)constructing the tutorial content.

It is important to have an overview or global outlook on the project. Planned evaluation from the start must be kept high on the agenda, then useful results with modest resources are attainable. Planning for testing is crucial so that relatively little time and money is spent on it. This is vital so that a working version of the software is ready in timely fashion (which is often determined by the availability of test subjects as found in chapter 6). Furthermore, in developmental projects, more time after the test must be allowed, so modifications can be made. These are not often very lengthy to make but they must be allowed for at the planning stage. Useful evaluation leads to action and is largely wasted if it is done too late to make changes (Laurillard 1994).

As part of this planning stage the evaluation methodology must set the nature of the criterion. Any evaluation study should have both open-ended measures for detecting surprises and fixed measures for generating comparative data that can answer specific questions. Without fixed measures a definitive statement about the courseware may not be made. Only an unstructured set of observations and opinions from individuals can bring about results shared by other learners. Without open-ended measures there is no chance of detecting problems or anything not thought of in advance and it is from the unexpected that most improvements stem (Mason 1996).

Evaluation Paradigms

The field of educational evaluation has developed very rapidly. According to Mason (1996), there is a real need to devise evaluation methodologies to assess the value of this new teaching medium. The steps are to examine existing approaches and draw out the relevant strategies, then propose techniques unique to the nature of web-based distance learning materials. There is no tried and tested methodology for assessing educational value. Published literature on digital distance learning materials consists mainly of application orientated descriptions.

Mason (1996) states that three evaluation paradigms have emerged; postpositivism, interpretivism and the critical theory approach. Postpositivism is an experimental approach gaining quantitative results. It uses surveys and observation as the tools to get user feedback. This data is then critiqued by using varied analysis, theoretical perspectives and value frameworks. Next, the data is statistically analysed by the use of regression and cluster analysis. Interpretivism is based on social constructions of meaning. This is inherently time and place dependent. It relies heavily on qualitative methods. The evaluation tools most often used in this paradigm are interviews and observations. The Critical Theory approach places focus on self-awareness that is situationally-located in the structure and value bases of the social phenomena. This theory attempts to illuminate self-awareness through a historical perspective, not through any particular evaluation tool. The focus of the evaluation will reflect the primary motivation, assess the value of the investment and analyse the quality of learning and nature of educational interactions.

Ellington (1993) points out two contrasting evaluation paradigms; the scientific approach (agricultural/botanical) and the humanities approach (social/anthropological). Scientific methods use tight controls and produce measurable outcomes. Some historians argue that such an unnatural setting invalidates the outcomes produced as being statistically manipulated (Elton 1982). The humanities approach is more concerned with the on-going process of education. This qualitative approach is more subjective and often involves personal value judgements. The outputs from this approach are more varied and difficult to measure. The DELBERT case study (chapter 6) uses the social/anthropological methodology.

Types of Evaluation:

Evaluation can be classified by four types. Formative evaluation helps to improve the CAL (computer aided learning) design by supporting the

communication process, while Summative evaluation can help the user choose which CAL product to use by giving a test/survey result. Illuminative evaluation helps uncover important factors latent in a particular situation of use and Integrative evaluation tries to help users make the most of a particular piece of CAL (Mason 1996).

Formative Evaluation:

Testing is part of all engineering. The traditional use of formative evaluation is a part of the software design cycle. The illustrations below (figure 3.80) compares these design styles (Dix 1993).

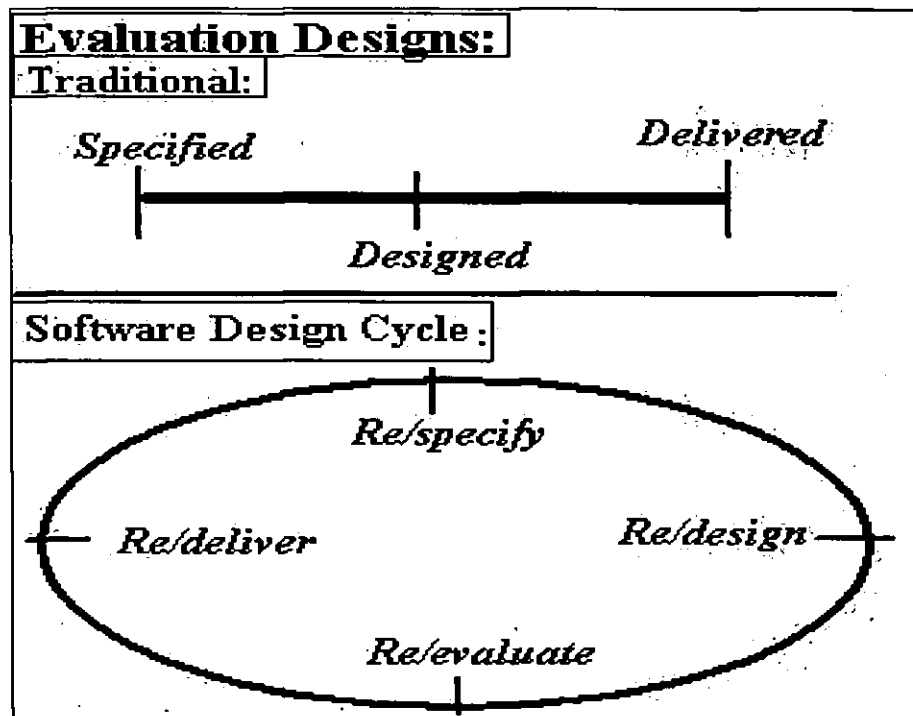


Figure 3.80 Evaluation design cycles

The traditional design methodology was linear. A product was specified, designed and delivered. The software design cycle has an iterative quality. When adapted to the web, formative evaluation takes an on-going role in the development of the learning environment as seen in figure 3.81. First the

software goals and user's needs are established. Next, a storyboard illustrates the navigational flow and multimedia features of the website. Applied formative evaluation is an on-going iterative process that helps define the system and meet the student's needs. From this feedback the revised content is distributed over the web. Central to this model are the learning principles (chapter 2) and communication protocols (chapter 3) developed by this research.

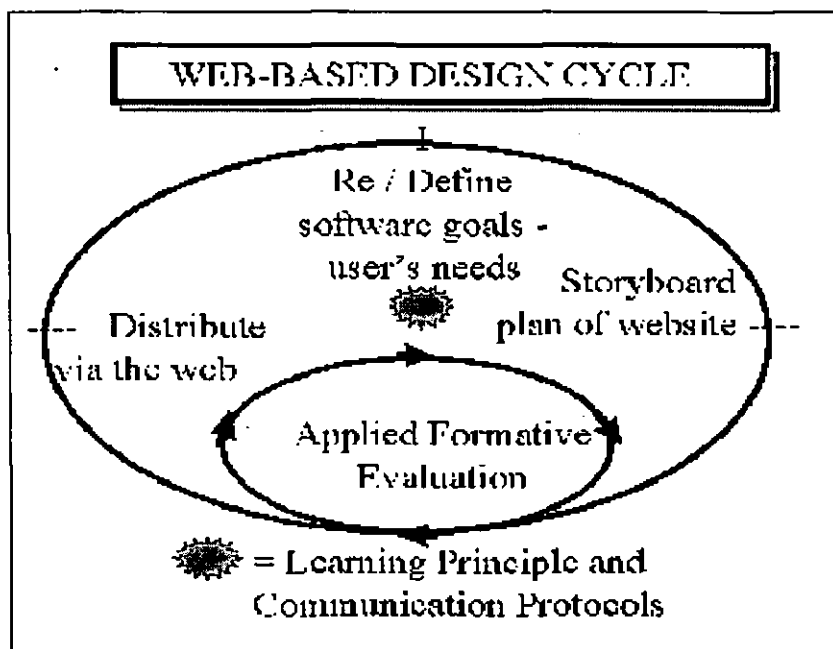


Figure 3.8t

The web-based design cycle

This study refines formative evaluation in its context to the web-based distance learning material. Formative evaluation gives timely feedback and constructive criticism. This is another link to the Constructivist learning theory (chapter 2). In the (analogue) university setting lecturers have been known to use feedback from student surveys distributed after the course. This method can be applied to the digital learning environment. If formative evaluation techniques are embedded within the structure of the web-based distance learning material design then constant feedback can be given to the

teachers and designers. Traditionally a key point for the use of CAL was that such testing be done in time to allow changes to the material before the end of the developmental period. This process now becomes a recursive, iterative cycle. The content of the tutorial assumes a less fixed nature. Instead, with the fluid nature of the web, formative change can be ongoing.

Summative Evaluation:

This discussion examines summative evaluation from an engineering and educational perspective. Summative evaluation strategy fits with a tradition in the literature for comparative experimental testing. The users feedback about the application is analogous to consumer reports. This relates to how the users input should have an effect on the product design cycle.

In an educational context summative evaluation often produces quantitative results. Tests produce records of various aspects in the learning process by which measures can be set. These can grouped in two types; norm referenced and criterion referenced. When summative test scores are compared to others in the same group this is said to be norm referenced, while criterion-based referencing compares the individual's summative result to a pre-existing standard (Biggs 1982).

The DELBERT Tutorial system (chapter 5) uses a norm-based formative evaluation system. Feedback is measured against that of others in the group. It is not compared to a pre-existing standard. If a summative assessment were to be implemented it would be a peer review strategy. In this case the student's pre-test (or first draft solution) would be weighed against their second submission. A set of guidelines would be followed to determine the amount of progress or improvement made through the course of study. This is keeping in line with Web-Constructivist principles. The focus of the assessment is on the process of learning, not the end product (Bensusan 1996).

Illuminative Evaluation

The Illuminative technique is an open-ended method of evaluation designed to detect what the important issues are with regard to the users needs. Without this form of inquiry other methods may ask the wrong questions or measure the wrong things. This methodology is seen in focus group interviews. The feedback from this inquiry will help produce the questions on the web-based survey for the next group. This approach (a.k.a.-the social/anthropological approach mentioned above) pays more attention to what happens during the educational process itself then the product of the lesson. (Ellington 1993). This approach is taken for the case study methodology in the DELBERT Tutorial system pilot study. (see a section 6.2)

Integrative Evaluation

An Integrative study concentrates on the real use of CAL as part of a university's course structure (Draper 1995). Specialised evaluators are used who can gather detailed information that goes beyond the data collected by teacher's surveys at the end of term. They argue that for many teachers in practice, the question is no longer whether to use CAL, or which package to use (since this has often been decided already by administration), but how to make the best use of the CAL material. Often a new technology is introduced without preparing the proper infrastructure to effectively use it. In other words, some CAL software may be purchased, but, unless it has the support of teachers it won't be used. It is necessary to incorporate the use of the CAL package into the curriculum. Training the staff to use the technology should not be done as an after thought (Laurillard 1994, Papert 1980).

A good example for the use of Integrative evaluation would have been in the case study presented by B.P for the use of video conferencing [6.4]. The company had just spent thousands of pounds (sterling) on video conferencing systems for the traveling sales personnel. The intent was to save money on

travel expense. After several months it was found that none of the sales staff were using the technology. A survey found that the reason the technology was not adopted was because there was not tax deduction for the use of video conferencing as there was for travel in a car.

3.9 Applying Formative Evaluation Methodologies to the Web

The following are several methods of recording user feedback; surveys, interviews, empirical observation, computer generated data, qualitative journals, case studies and physical response (Cohen & Manion 1994, Nardi 1997). These are applied to on-line tools in chapter four of this report. The survey /questionnaire technique is a powerful tool for exploring aspects of computer aided learning (CAL) applications used with large numbers, over a period of time or a variety of settings. Questionnaires as a feedback device have been around almost as long as the written word. What has changed is the medium through which they can now be delivered. In the past questionnaires could only be done *live* or on paper. The paper methodology relied on *snail-mail* and usually had a poor response rate (about one percent). In today's digital world feedback can be gained from remote locations using several means. Open-ended responses can be achieved through e-mail or text entry HTML forms on the internet or Javascript e-mail surveys (chapter 4.3). Alternately the questionnaire can be given via video or audio conference. The use of the pre and post-course questionnaire is an important source of data. The pre-course questionnaire measures the student's characteristics and expectations (as demonstrated in the DELBERT Tutorial system 1st Solution page - chapter 3). While the post-course questionnaire focuses on detailed evaluations of the effectiveness of the on-line course or segments (chapter 3 - DELBERT Tutorial system 2nd solution page) [6.6] (Collis 1991).

One element which must be considered in this form of evaluation is memory /recall. Asking a student about a teaching episode retrospectively is not nearly as informative as gathering data on the spot. Integrating evaluation within the

on-line tutorial increases the accuracy of the student's feedback. In some cases the longer after the event they are completed, the less valuable (Mason 1994 et al). This is illustrated in chapter 5 with the web-survey presented immediately after the main content of the lesson.

There are of course disadvantages to survey techniques. The accuracy of the detail is dependent on the respondents subjective impressions and memory of events. Generally speaking, pre-formatted questions or number scales (a.k.a. - Likert Scales) are confining and annoying to many users. Measuring group processes on-line is difficult with pre-structured answers. Open-ended questions are better for collaborative interactions (Cohen and Manion 1994). This method allows more scope to convey attitudes and experience but does not allow evaluators to question and clarify their comments. Generally it is suggested to use a mix of the two (Mason 1996).

Interviews -

The interview is an open-ended technique that can yield some powerful data. Two types are the individual or the group interview. This is a grass-roots testing methodology asking those who live the experience to report their reactions. The disadvantage in the past has been in interviewing a diverse enough sample to make a wide enough generalisation. This issue is addressed in this research methodology by conducting on-line virtual interviews via video conferencing (see chapter 6). Protocols for this testing methodology are discussed in chapter three of this report. The group interview is often an overlooked asset to research. Group discussions centred on topics of concern to all participants in the group and the researcher are the focus of this particular methodology used in the pre-study (chapter 8). The researcher acts as a moderator. This can be done through CMC (computer mediated conferencing) or video conferencing. By having the participants interact amongst themselves certain advantages arise. From the practical standpoint it is cost effective, by allowing the researcher to gather data from many

participants at once and less time consuming as well. The results that come of this technique are different since it is participant lead. This strategy is useful for research focus groups. This pilot group of interviews is done with small numbers and specific purposes in mind. It may be to get feedback from the sample test group for questionnaire design or other formative concerns. The interviews should be done objectively and not ask leading questions.

Observation-

Observation is another powerful tool for evaluation. This may be done live or through on-line techniques. It can be done individually or as a group. Observations can be done with the evaluator in the room and/or via analogue video surveillance (as in the pre-pilot case study in chapter 6). In this way the subject may be kept unaware of the evaluation process, thus, producing a more natural reaction. Digital video conferencing can be used as well. However, this medium is best used for point-to-point (one to one) observations.

Computer generated data-

Computer generated data is an ideal testing methodology for on-line evaluation. Data can be taken in quantitative and/or qualitative forms. On-line HTML questionnaires can use more transparent means which measure user log-in traits. These are seen in CMC experiments with records of user log-in times, frequency of use, etc. (Collis 1991). Open-ended feedback can also be generated with HTML forms and e-mail replies. User input to CGI (common gateway interface) databases are still somewhat limited. For example, if the user misspells a word the text entry may not be properly registered. Software can be used to automatically generate graphical representations of the results gained from these methods. It may be necessary to know that the input is from the correct individual. There is also the possibility that the input could be a group consensus instead of one student. Security must be controlled in on-line experiments. Although it may be nice to give the user the freedom of an

anonymous identity, this makes control of the experiment uncertain. Using a log-in system helps with tracking and recording information unto a database that allows for verification of user identity. This may be done by giving each student their own password or a central password for a secured on-line site.

Qualitative journal of significant events-

A diary of significant events, or qualitative journal, can be recorded in many ways. It may be in traditional paper form or audio recording, etc. This may be done digitally as well. In chapter 4, an annotation page written in Javascript allows the student to maintain an on-line journal. Participants can be asked to focus on any particular aspect of their on-line experience with these techniques and therefore are very appropriate for investigating collaborative on-line experiences. Issues in past studies using this method have been in problem solving messages, information exchange, general discussion, technical help, and content or social specific questions. This method is one of the least used evaluation tools, however, due to the lengthy transcript analysis (Mason 1996). The addition of this technique in the full case study is recommended (chapter 7) as an on-line logbook.

Pilot projects -

The importance of pilot projects is an area that should not be overlooked. Examining case studies of similar research allows a comparison in evaluation methodology. In some cases the evaluation was not included in the project design. This should come out when analysing the results or the experiment. The case studies for this research are analysed in chapter eight.

Measuring physical response-

Nardi (1997) presents an evaluation methodology that measures physical response. Sensors are attached to the student's skin that records a *galvanic* response [8a] to prompts from the computer.

3.9.1 Summary Discussion

On-going evaluation, according to Ellington (1993), should always be an integral part of the design process. The root of the word *evaluate* is after all 'value' which, in this case, would refer to the value of the lesson.

"The importance of using evaluation procedures to monitor the instructional system should shed light on the appropriateness of the teaching methods used (see chapter 5), the structure adopted, the implementation strategy, the assessment methods and even the aims and objectives themselves. With each successive cycle of the system, the teaching/ learning situation should become progressively more finely tuned, and should consequently become more efficient and more effective through a continuous process of evolution and improvement." (Ellington 1993)

Thorp (1988) defines evaluation as the collection, analysis and interpretation of information about any aspect of a programme of education or training, as part of a recognised process of judging its effectiveness, its efficiency and any other outcomes it may have. While Rowntree (1992) comments on this definition with these points:

- Evaluation is not another word for assessment, although examining the quality of the learning process may be the outcome of the evaluation.
- Evaluation needs to be able to pick up the unexpected, not just be concerned with what is meant to happen.
- Evaluation needs to be a planned, systematic and openly discussed. It is not just keeping records or writing a report. It is a public commitment to purposeful inquiry.

The DELBERT Tutorial system (chapter 5) design supports these points described in the evaluation process. A web-based formative evaluation methodology is detailed in the DELBERT Philosophy Case Study (chapter 6). A critical analysis of applied formative evaluation methodologies used in this research will be conducted upon analysis of the data gained in the full case study.

CHAPTER 4: ADAPTED ON-LINE TOOLS

Objective of the chapter –

This chapter takes a detailed examination of several on-line communication tools that support collaboration in a web-based environment. The tools discussed are; e-mail, e-mail surveys, HTML forms, Javascript and video conferencing.

Each of the on-line tools in this study supports at least one of the Web-Constructivist principle below:

- **Support the active construction of knowledge in the mind of the student** – via: [*HTML forms*]
- **Embed learning in a social experience** – via: [*e-mail and video conference chat*]
- **Use multiple modes of representation (multimedia)** –via: [*Javascript text and graphics windows*]
- **Support the sense of ownership and a voice in the learning process** – via: [*Javascript login and HTML active entry forms (guest book technology)*]
- **Give the opportunity for reflection** –via: [*Web-survey and HTML forms for posting essays*]
- **Support interactivity with feedback, thus promoting motivation** –via: [*Javascript e-mail forms*]

4.0 In Brief

This chapter focuses on the technical on-line tools used in this research to support formative evaluation (feedback) methods (chapter 3) and illustrate Web-Constructivist principles (chapter 2). The tools adapted for use in the DELBERT Tutorial system to support a web-based problem-solving collaborative environment are:

- E-mail and E-mail surveys
 - using text, attachments, from HTML forms or hyperlinks, distributions lists and filters to specified folders, and surveys.
- HTML forms
 - for DELBERT start problem and tutor sample solution, Mentor help, Glossary and Links entry page. HTML form to: private or public HTML page, text file and/or data base.
- Javascript
 - password protection, personal name entry, alert boxes, new browser windows, annotation windows, embedded sound with accompanying scrolling text, self assessment (multiple choice and matching), e-mail distribution lists and questionnaires, graphical representation of data including time/date stamp.
- Video Conferencing
 - systems and software features, LAN v. ISDN, DELBERT interview with text chat.

Although each tool is examined separately it is important to note that one aspect of achieving successful results lies in the methodology of use. These tools need to be unobtrusively staggered throughout the tutorial system in a way that allows for cross checking. The results produced from each tool needs to be related to another for cross-reference verification (Mason 1996). This may be to compare input types as seen in a fixed Likert scale survey reply with an open-ended question, or feedback timing may be compared by

examining the input entered immediately after content is delivered to reflective feedback gained after the completion of the lesson.

4.1 E-mail and E-mail survey

Email has been around as long as the internet itself. In fact, statistics show that it is the single feature most used on the world wide web (Kraut 1997). There are many examples of e-mail systems. The general categories are; text based (i.e. - Alpha mail, Pegasus mail, Pine mail, etc.), graphical interface (i.e. - Pegasus mail, Eudora, etc.), internet browser software (Netscape and Explorer contain internal e-mail functionality) and free internet mail services (Microsoft Hotmail [5.1]). These systems use POP3, IMAP or SMTP mail servers. E-mail can be sent as a one-to-one (private) or one-to-many (distribution list) correspondence. The main elements of an e-mail address are the user identification (a.basiel@) and the e-mail service provider (mdx.ac.uk) (Brunner 1997).

The e-mail message can be transmitted through the e-mail system software or as a link in a web page. A one-to-many link can be achieved through several methods; a distribution list can be created within the software, Javascript can produce an e-mail with prewritten addresses or a ListServe group (i.e. - MajorDomo) can be joined. The e-mail software will allow the user to create a file containing "x" number of participants. That file name is then used as a reference tag for the e-mail system allowing the sender to write one message in the body and distribute it to all members of the distribution list. Javascript (see section 4.3) allows the LED to place a link or button on a web page that generates an e-mail prompt box with a preformatted list of participants. This may also include prewritten text in the body of the message. Alternately a newsgroup or ListServ allows a user to carry on an asynchronous e-mail discussion (or forum) with its members. These may appear on an HTML page or be sent directly to the participant's e-mail address.

Synchronous (live) text chat is a growing method of communication and collaboration over the web (Brunner 1997). This can be done with IRC (Internet Relay Chat) software. Many virtual learning environments [5.1] offer this method of dialogue to its members. Web browsers, such as Netscape Communicator, have this as an in-built feature. As an alternative to audio chat many video conference packages offer a live text chat window (see section 4.4).

E-mail can be accessed from an HTML page in a number of methods; a text hyperlink, a Javascript form or an HTML form. The first two methods produce a standard web-based e-mail prompt box interface produced by the browser software. Information is entered into this form and transmitted by the menu's *send* option. HTML forms collect the data directly from text entry fields on the webpage. The user must click a SEND button on the web page to transmit the data to the e-mail server. Using the HTML form has good and bad points. Information prompts on the web page can be

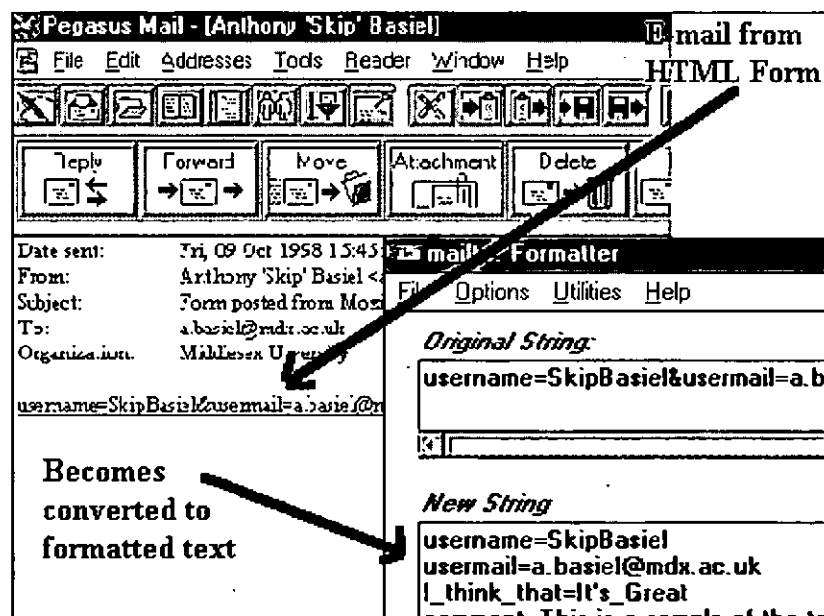


Figure 4.10

HTML form e-mail link to Formatter software

clearly organised to aid the user with data entry. However, the e-mail server receives the message as one continuous line of text as illustrated in Figure 4.10. Software is needed to break the text into properly formatted lines [5.2].

The LED (learning environment designer) has the freedom to choose from a variety of user interfaces and delivery methods. Depending on the nature of the communication from the e-mail and the person / group receiving it, the LED can tailor the design and functionality to best suit the needs of the student. This user-centred design approach is supported by this research.

Attachments are files that can be piggy-backed onto an e-mail submission. Depending on the software, attached files can be in a variety of formats such as: word processing (i.e.-.doc), graphics (i.e.-GIF), sound (i.e.-.wav), animated .gifs, video (i.e.-.avi), compressed files (i.e.-.zip) or executable programs (i.e.- .exe). The size of the attached file directly influences the size and transmission speed of the e-mail.

E-mail filtering is used by this research methodology. Rules can be set within the software to direct incoming messages to specific, pre-established folders. This may be done by using the senders identity or, as with the DELBERT Tutorial system, by detecting a pre-specified subject heading (i.e. - CONTENT HELP would be filtered to the subject expert not the LED). The folder receiving the e-mail keeps a quantitative record. When a set percentage of responses are logged the tutor is alerted to take action in this area. (Figure 4.11)

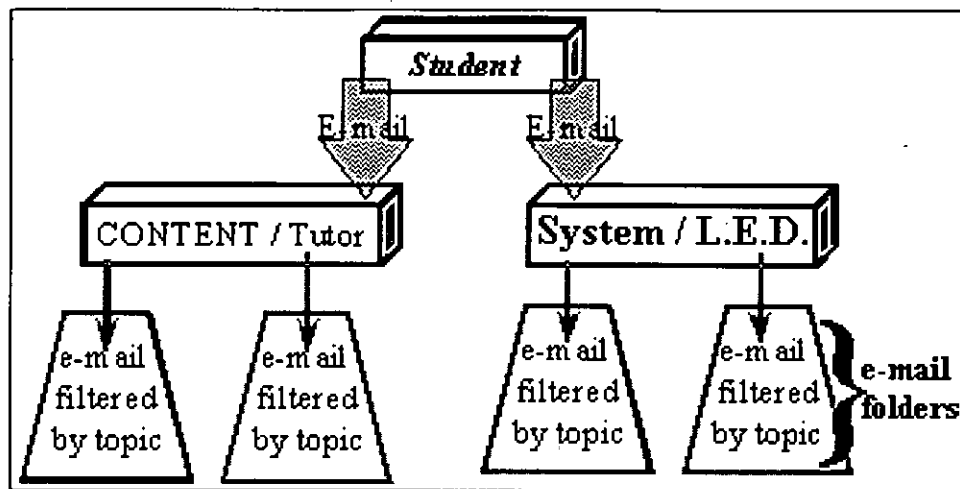


Figure 4.11 E-mail filtering system

Web-survey through e-mail is a powerful, on-line tool to get formative (qualitative and quantitative) feedback from the participants. Software is available which allows the LED to generate an e-mail questionnaire that can be sent to students. The software generates tags for each question allowing it to be indexed. The student simply clicks the REPLY button on their e-mail message box menu bar when they complete the survey. The reply is automatically processed by the software. Statistics produced by the software can be in spreadsheet or chart (graphical) form. Decisive Survey [5.3] software was used in this research case study. A word of caution about this software is that it is not compatible with all e-mail servers or software systems.

Auto-reply / message confirmation is another e-mail feature to provide the student with immediate feedback. The e-mail software system may be set to send an automatic reply to the student upon receipt of their web-survey. It may simply be a preformatted message saying, "Thank you for your time in sending your web-survey."

Web-Constructivism

E-mail supports a number of Web-Constructivist principles. In one-to-one correspondences interactivity is increased whether the student collaborates with peers or subject experts. Social exchange is evident in a one-to-many distribution list exchange. This principle, supported by Vygotsky's Activity Theory (Chapter 3), is illustrated by both synchronous (live) text chat and asynchronous (delayed) exchanges.

4.2 HTML Forms

HTML forms allow the student to communicate via text directly with the internet server. This may be done through the use of CGI (common gateway interface) scripting or, as in this research, Web-Bot components (as found in software such as Microsoft FrontPage). Graphics and animation may also be manipulated by the student using Caucus collaboration software [5.4]. The student's input can be sent to a number of locations from the text entry field on the web page. The four locations that data can be sent from the HTML form are; another HTML page, a text file, a database or an e-mail.

Locations that data can be sent from the HTML form	
A public HTML page (same URL)	<i>(a.k.a. A Guestbook Form) The text appears on the same page as the HTML form. Often, as in the case of this study, the URL needs to be reloaded by the browser to update the data located in cache memory.</i>
A public HTML page (different URL)	<i>The text submitted from the form will appear on a separate page from the HTML form.</i>
A private HTML URL	<i>The information is submitted to a URL that is not linked to the tutorial. This makes it accessible only to those who know the URL. Further Javascript passwords can be placed on the page for security purposes.</i>
A text file in the server	<i>The text entered into the HTML form can be placed into a separate .txt file in the directory of the webserver. Additional information such as the date, time, remote computer name, user name and browser type can be added to a file.</i>
A data base file	<i>The text can be stored and manipulated in data base software, although this research does not use this software.</i>
An e-mail address	<i>Data entered from the HTML form may be directly e-mailed to an individual or a group.</i>

Table 4.20 Data output from HTML forms

The student has a variety of interfaces with which to interact to submit information. These include open text fields, radio-buttons, check boxes, drop down menus, clear buttons, submit buttons and reload buttons.

Open text fields:

Open text fields can be set by size and location on the HTML page. They may include scroll bars if needed. The student may enter text into the field

by using these methods; direct entry or copy and paste. Direct entry of text requires that the student works on-line and physically types the information into the HTML form. It is recommended that before submitting the data it is highlighted and copied to the clipboard as a precaution. In this way if the text is lost in transmission it can be pasted, not retyped, into the form for another submission attempt. An advantage of direct text entry is that it is WYSIWG (what-you-see-is-what-you-get). There will be no formatting changes upon submission. Alternatively the student can work off-line with a word processing package or text editor. The information can then be copied and pasted into the HTML form. Formatting of text and non-recognition of font types can be a concern with this methodology. It is suggested to use a normal 12 point Times New Roman font saved as a .txt file format.

Radio Buttons

Circular HTML forms that add or remove a dot when ticked are called Radio Buttons. These are useful when the student can select only one choice from a given set of responses. This is a popular tool for web-surveys when the student is asked to provide feedback on a Likert scale. This methodology is good for YES/NO or TRUE/FALSE responses.

Check Boxes

A square HTML form that produces a check mark when ticked is called a check box. This form gives the freedom of allowing multiple selections. This is another popular input device on a web-survey, the student may be prompted to *tick all topics that are correct*.

Drop Down Menu

A rectangular text field with a "down triangle" to expand the menu tree is another way to prompt the student for a response. When the down arrow is clicked multiple rows of one-line text appear as active pre-set choices. Once

highlighted that response may be submitted. As a tool for self-assessment this is useful for short-answer, multiple-choice questions.

Submit Button:

This form button contains the scripting which sends the data input from the HTML forms mentioned above to the server. It can be labeled with any text (but not graphics) such as SEND, JOIN, ENTER, etc.

Clear or Reset Button:

This button gives the student an opportunity to clear away any data entered into the form and reset the values to a default setting.

Reload Button:

The function of this button is to reload the HTML page from the web server into the local cache memory of the user's computer. This allows the new data to be re-posted. It can be done from the browser menu or as a Javascript button (see section 4.3).

Advanced features

Some HTML forms scripting will verify a student's input submission. This may be displayed as an HTML page confirmation prompt displaying the data entered before it is sent to the server. The student is given the option to submit the information or use the browser BACK button to re-enter the data. There is also an advanced feature which checks for blank input fields or invalid data types. If the user fails to enter required information or the wrong characters (i.e. - numbers in a NAME text field) a prompt is displayed as a new HTML page explaining the necessary changes needed.

check box - Netscape

File Edit View Go Communicator Help

Bookmarks Location: <http://skip.mdx.ac.uk/test/htmlforms.htm>

Check Box sample:

Tick the colours you like: ☒ yellow ☐ blue ☒ green ☐ black

Radio Button sample:

Answer: $2+3=5$ ☒ true ☐ false

Drop Down Menu: Are you happy? Choose one below.

Figure 4.21 Several HTML forms

The Caucus web site [5.0] is a good example of an advanced system exploiting HTML forms and Guestbook technology. This application allows the user to enter text, images, animated-.gifs and/or HTML tags into the form field for submission to the web site page for group discussion forums. Spell-checking is another useful feature of the system offered to the user before submission to public posting.

The DELBERT Tutorial System

The software produced to illustrate the principles and protocols adapted and developed in this research makes heavy use of HTML forms or GUESTBOOK technology through the Web-Bot components in Microsoft FrontPage. The next chapter (5) examines the software in great detail. The following table highlights the use of HTML forms throughout the student's learning experience.

HTML form description	HTML form function	URL:
1) Short survey checking student's comprehension of the start problem	Radio button, drop down menu and open-ended text field prompts	http://skip.mdx.ac.uk/DELBERT/
2) Form used to submit first solution	Questbook - Large text box form to post student's e-mail ID, solution and related biography links	T1_start.htm (after start problem)
3) Glossary Active Entry Page	Questbook - Text box form to post student's entry of new glossary terms, acronyms or URLs for the lesson	T1_start.htm (near bottom of page)
4) Weblinks Active Entry Page	Questbook - Text box form to post student's entry of URLs to support research for the lesson	active_entry.htm
5) Mentor Help Page	Questbook - Text box form for entry of e-mail addresses of peer student mentors (on-line help system)	active_web.htm
		mentor_help.htm

Table 4.21

Matrix of HTML forms in DELBERT

Web-Constructivist Principles

HTML forms illustrate several Web-Constructivist principles (see chapter outline). The DELBERT Tutorial system makes an environment by which the student can actively construct knowledge using a variety of active entry pages. The student takes a pro-active, not passive, role in the learning process. By communicating with peers and subject experts through HTML forms the student can experience a (virtual) social experience. Their knowledge is constructed from dialogue that occurs in on-line discussion, collaboration and argumentation. Finally the student is encouraged to reflect on the content presented within the tutorial system or content submitted by peers before posting a response or conclusion in a discussion.

4.3 Javascript

Although there are many multimedia options on the Web, most require specialist software which can be a slow, time consuming process of downloading plug-in applications. The Minimalist approach suggests using the simplest method to attain the desired goal (Boyle 1997). Using a client-side scripting language, like Javascript, supports this approach in web-based

learning environment design. The basic specification for viewing these examples is a Java capable browser that is set to view graphics/animated-gifs. An alternative method of distribution would be to place the files on a CD with a copy of a browser that would allow the information to be accessed locally.

This research supports a problem-solving seminar teaching strategy that encourages an active use of the student's prior knowledge to argue with his peers to produce a resolution. There are several steps to this protocol (Jackson 1996, Bensusan 1995):

1. A starting problem is introduced with its related real-world context.
2. Drawing upon prior knowledge and on-line research sources (i.e.- digital libraries, museums, universities, etc.) help form a preliminary conclusion.
3. Collaborate and confront peers to reaffirm or reassess that solution.
4. Compare this answer to a sample solution produced by the tutorial subject expert.
5. Reaffirm or reassess the answer based on that information

The main categories of functionality for using Javascript in a web-based learning system are discussed chronologically as they would appear throughout the lesson:

1. *Passwords*
2. *Personal name entry*
3. *Multimedia content*
4. *New browser windows and annotation windows*
5. *Alert boxes*
6. *Self assessment*
7. *E-mail tools*
8. *Graphically representing feedback*

1. Passwords

Security is an issue for any on-line learning system. There are three levels of password protection [5.1a] available with Javascript. An Alert Box prompts the student for passwords to enter the lesson. (Figure 4.30) The collaborative nature of the web supports the second Constructivist principle (embed learning in a social experience) allowing participants on-line social exchange via e-mail, news groups, computer mediated conferencing (CMC), Internet Relay Chat (IRC) rooms and video conferencing (Laurillard 1996 & Brunner 1997).

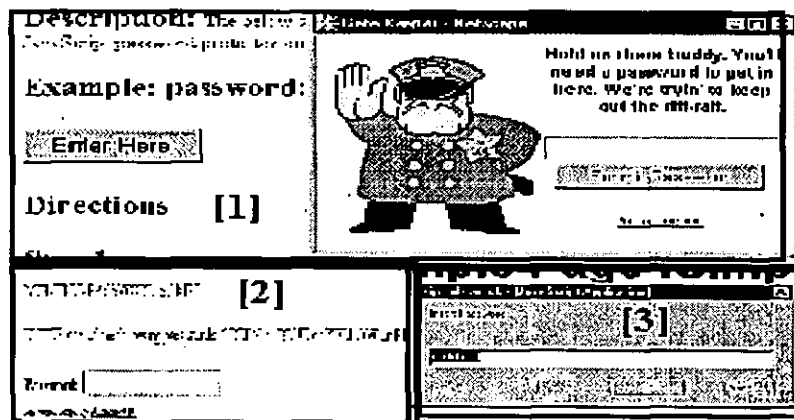


Figure 4.30 Javascript passwords

2. Personal name entry

To personalise the lesson introduction of the start problem Javascript can be used to prompt the student for their name [5.2a] that is then placed at the top of the page for each use. This reinforces ownership in the learning process. (Figure 4.31)

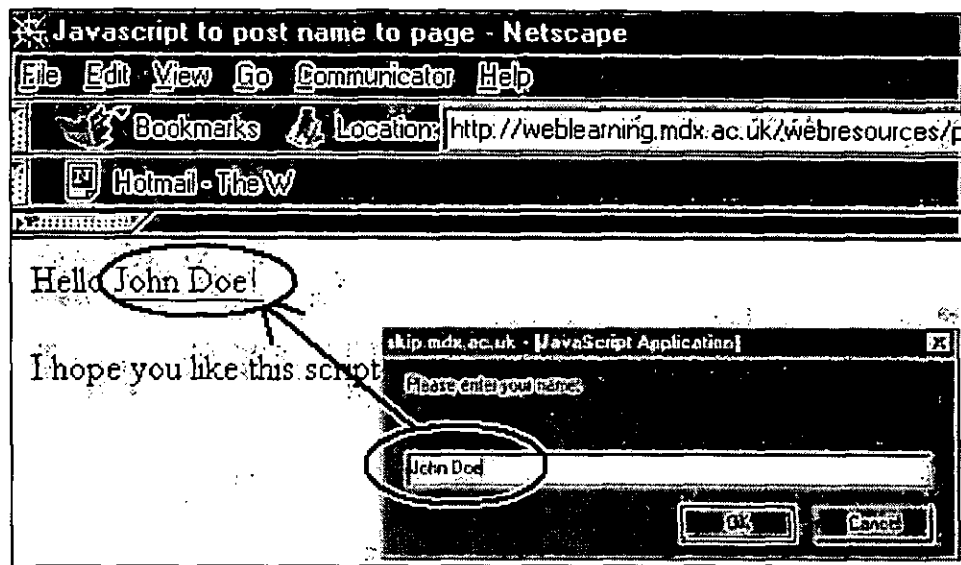


Figure 4.31 Javascript prompt for username

3. Multimedia content

A number of Javascripts are available to present the start problem and related content which make use of multimedia to support multiple modes of representation. User interactivity with the material encourages motivation from the participant that supports Web-Constructivism (chapter 2).

Information can be in the form of text, still images, animated-gifs (slide show), .avi movie files converted to animated-gifs (using GIF Constructor Set software - <http://www.mindworkshop.com/>), a series of .gif images taken to simulate a circular pan effect [5.16a] and/or sound as .wav and midi files. The graphics can be image maps that have clickable hyperlinks to increase interactivity. Other multimedia tools requiring special plug-ins are not recommended by this study (i.e.-Quicktime movies for a 360-degree virtual reality effect).

4. New browser windows

There is a Javascript [5.3a] that allows a new browser window to appear over the original screen. This can vary in size, location and features. It can be used to reinforce the content by representing it in another modality. This top window can contain animation to imitate a media player. Sound can be embedded in the HTML file to play upon the page opening or on a mouse click or mouse over event handler. [5.15a] The new browser window can act as a windows-help-file by placing hypertext to offer glossary terms or how-to instructions. (Figure 4.32)

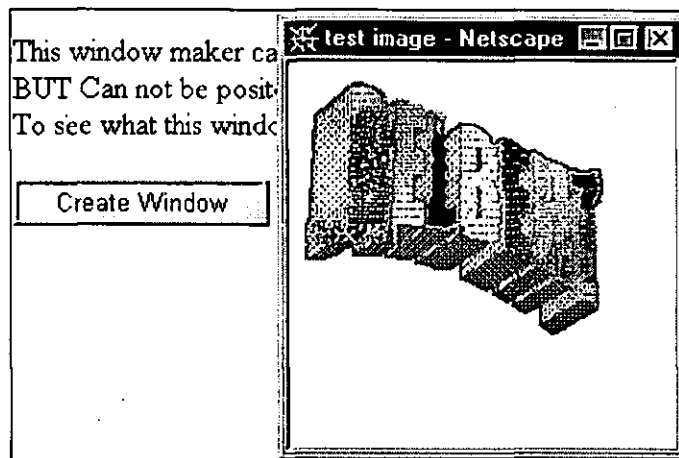


Figure 4.32 Javascript new browser

5. Alert boxes

There are three main types of alert boxes; a) message b) feedback c) exit.

a) message

Alert Boxes (a.k.a.: message boxes, prompt boxes, etc.) are another set of Javascript tools to promote an active, immediate response from the student in the learning process. There are a variety of ways they may be placed throughout the delivery of the tutorial content. For example, upon entering the HTML page containing the sample solution an Alert message form [5.4a] can prompt the student to confirm that they have developed their own solution before reading the tutor's example. This Javascript tool again illustrates the principle of increasing learning through interactivity.

b) feedback

At anytime during the delivery of the content an immediate feedback response is available by clicking a button that may produce an Alert Box response [5.5a] or some text on the page [5.6a]. The text can be a positive/negative prompt (i.e.- "Correct! Well Done. or Sorry! Try Again.") or directions to the location of supportive material (i.e. - "Correct: More details can be found at this URL: <http://www.morestuff.com/> or Sorry! You may wish to review this material before going on: <http://www.reviewstuff.com/>") [5.7a] (Figure 4.33).

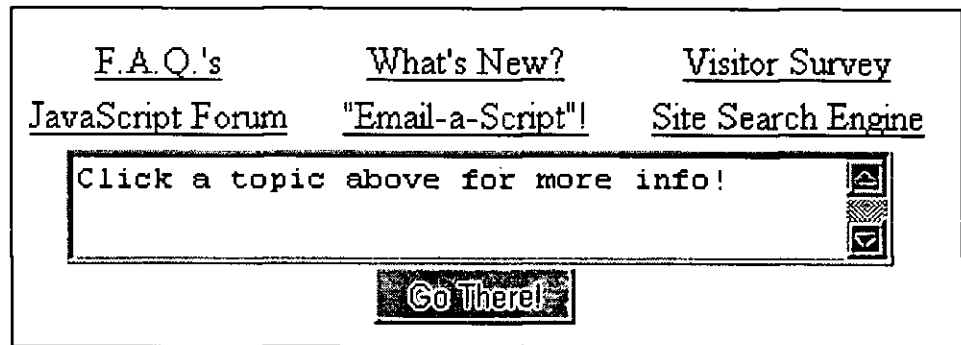


Figure 4.33 Javascript feedback prompt

c) exit

Upon completing a section of the tutorial an exit prompt can be issued. Clicking a next or exit link will bring up a "Do you wish to leave this part of the lesson?" query [5.8a]. These embedded Javascripts prompt the student to reflect upon their learning experience throughout the tutorial, which is an important quality of learning in Web-Constructivism.

6. student self-assessment

Student self-assessment is a powerful method of encouraging reflection, a necessary part of the learning process (Laurillard 1994). This research suggests using self-assessment as a formative method of evaluation (feedback) in the learning system in addition to the traditional summative (end exam) assessment techniques.

There are three general categories of self-assessment examined in this research; **closed-response**, **open-response** and **mixed**.

Closed-response

Two closed methods are multiple choice questions [5.9a] and matching [5.10a] using Javascript. Both give immediate feedback, thus supporting interactivity between the student and the system (see chapter 2).

The screenshot displays a web-based self-assessment interface. It is divided into two main sections: a question area on the left and an 'Answer Window' on the right.

Question Area:

- Question #1:** 'How many bones in the foot?' with multiple choice options:
 - ☐ A) 25
 - ☐ B) 26
 - ☐ C) 27
- Question #2:** A matching exercise with three items on the left and three options on the right.
 - Item 1: 'Stores whether a checkbox is checked' (next to a dropdown menu showing '1').
 - Item 2: 'Stores the URL of the current page' (next to a dropdown menu showing '2').
 - Item 3: 'Stores the URL of the previous page' (next to a dropdown menu showing '3').
 - Options on the right:
 - ☒ a. lastpage.url
 - ☒ p. checkbox.checked
 - ☒ q. location.href

Answer Window:

- Header: 'Answer Window'
- Text: 'This self-grading exam consists of 3 questions. Answers are entered by clicking the option button corresponding to your selection. The test is scored by clicking "Grade" "Test" at end of the exam. Correct answers are found through hypertext links located at the end of the exam.'
- Buttons: 'Grade Test' and 'Test'.
- Correct Answers:** '#1, #2, #3'.
- Feedback:** 'You answered 0 of 10 correctly for a score of 0.' followed by '#1 wrong!' and '#2 wrong!'.

Figure 4.34 Javascript self assessment

7. E-mail tools:

Open-response

Three methods for exploiting the e-mail Javascript tool are; 1) preformatted distribution lists 2) use preformatted subject headings to filter responses 3) preformatted e-mail surveys.

1) preformatted distribution lists

A Javascript e-mail distribution list illustrates an open response method [5.11a]. By clicking a button a preformatted e-mail message box with an open-ended question can be automatically sent to the group for

collaboration and discussion. The student's social experience (Vygotsky's Activity principle – section 3.41) is supported by this tool. The tutor may also receive a copy of the submission. The student will not be able to use the e-mail reply button since the message was posted to their own address. It is necessary to include the original URL for the distribution list link in the body of the message. The student has the flexibility to return there and reply to the comments .

2) use preformatted subject headings to filter responses

Many e-mail applications have filtering capability that would allow the e-mail generated with a preformatted subject heading to be placed into a specific folder (Brunner 1997). This has the benefit of helping the on-line tutor organise the potentially large number of correspondence. Alternatively, the e-mail address used for the CC: prompt can be a separate account designated for that on-line class. Many free e-mail services are now available on the web which can be used to receive specific student responses (i.e. - <http://hotmail.com/>).

3) preformatted e-mail surveys

Reflection can be encouraged after the lesson is completed. On-line surveys can be submitted as HTML forms [5.12a] or as preformatted e-mail questionnaires [5.13a], both of which get mailed directly to the tutor for interpretation and action. This strengthens the learning process by supporting Web-Constructivist principles.

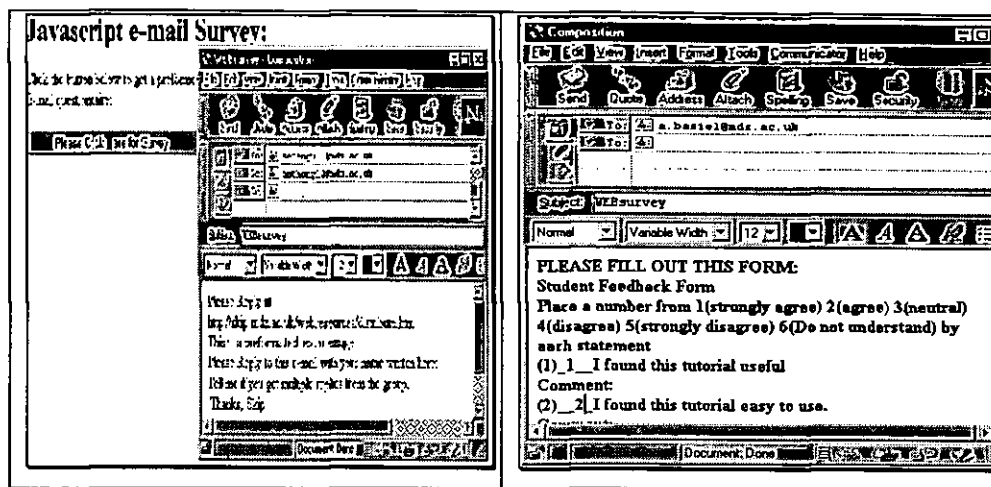


Figure 4.35 E-mail surveys

The text submitted from the HTML form will appear as one continuous line of characters in the body of the e-mail message. It is necessary to use software (such as mailto: Formatter v.4.01, rpfries@interaccess.com) to format the text into separate lines. (Figure 4.10)

mixed

A mixed response combines a fixed reply and open-ended option. This form of feedback is the strongest methodology for gaining both statistical data and the unexpected comment. An example of this is a Likert scale survey which includes an optional description (i.e. - I found the tutorial () good () fair () bad. Why? _____) (Mason 1992).

8) Graphically representing feedback

The data collected by the web-survey can be inserted into a Javascript chart builder to provide a graphical representation of the student feedback for the tutor [5.14a]. This can be printed with the current date on the page for record keeping purposes. This script supports the principle of using multiple forms of representation. (Figure 4.36)

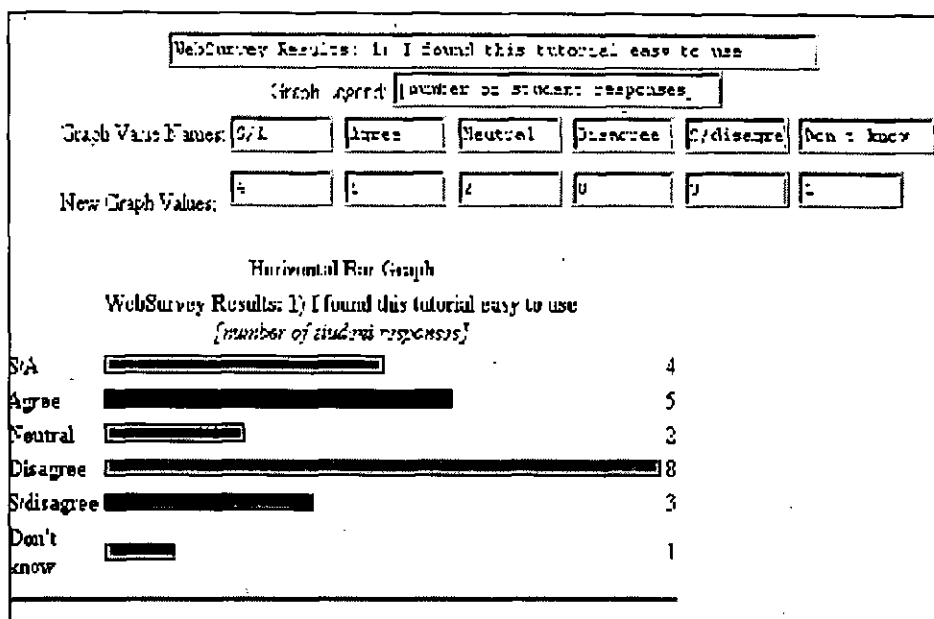


Figure 4.36 Javascript: graph of e-mail

4.3.1 Entering Javascript into HTML

To insert these functions into a web-based tutorial the learning environment designer (LED) simply copies and pastes the code. First, go to the URL of a sample Javascript (<http://www.skip.mdx.ac.uk/javascript>). Next, select the option to view the document or page source from the browser menu. Look in the <HEAD> and/or <BODY> tags of the HTML page for the <SCRIPT="javascript">, <script language="JavaScript">; <FORM> or <embed src="details of the sound file">. Then, copy the code to the corresponding closing tag (i.e. - </script>). Finally, paste the code into the same location in the new HTML page. Modify the text according to the new specifications. For example, change the terms on the matching self-assessment test to your exam questions. Remember to save the changes to the new HTML document and reload the browser to observe any modifications.

4.3.2 Summary

Javascript can support Web-Constructivist principles through every stage of the problem-solving seminar teaching strategy. The learner makes active use of the knowledge by interacting with the tutorial system, on-line resources and colleagues in the lesson. This social approach to learning can be achieved using Javascript e-mail tools. Information can be presented in a number of multimedia formats using images, animation, sounds and simulated virtual reality. An alert box that places the student's name on the HTML page empowers a sense of ownership. Using formative feedback tools embedded throughout the tutorial the participant has the opportunity to voice their opinion, thus prompting change in the tutorial content or delivery methodology.

Reflection, an important element in the learning process, is built into the teaching strategy protocol. At the start of the lesson the student is prompted to reflect in order to solve the starting problem. At the end of the lesson self-assessment tools also allow review. Web surveys prompt the student to reflect on the learning experience and provide the learning environment designer (LED) with the formative feedback necessary to alter the tutorial system to meet the student's needs. Throughout the tutorial the student is prompted to interact with the system, participants and tutor / LED to promote motivation through feedback.

This research demonstrates that by using a problem-solving seminar teaching approach supported by Javascript tools and using the protocols developed in this study a true Web-Constructivist Learning Environment can be realised.

4.4 Video Conferencing

Video Communication encompasses sight and sound. The transmission can be one-way or two-way. There may be only two people/locations involved

or multiple links. The degree of interactivity, and hence the experience of the learning session, can vary on the system used.

Type of Video Conference	<i>T.V. Lecture</i>	<i>T.V. Chat Show</i>	<i>Desk-top V.C.</i>	<i>Video Teaching</i>
Number of Participants	one-to-many	small group-to-many	small group-to-small group	many-to-many
Audio / Video Path	one-way A.V.	one-way V & two-way A.	two-way A.V.	two-way A.V.

Table 4.40
Attributes of videoconferencing

On the low end of the scale is one-way sight and sound as illustrated by the Open University's BBC TV courses. Next, TV talk-shows that involve call-in viewers increases interactivity. Desk-top video conferencing (V.C.) allow up to a handful of people to effectively interact. The ideal system is used in video teaching. Here any number of students can communicate with the teacher / moderator and each other. An excellent example of this is the two-way interactive TV distance learning programme of NAU - Northern Arizona University - USA (Bensusan 1995, [5.5]).

A desk-top video conferencing session is expected to involve an interactive discussion between up to six people at each site, and in many cases these sessions are between only two sites at a time. One characteristic of desk-top video conferencing is that the physical relationship between cameras, monitors, and people using the system is fixed and stable so that the system can be regarded as electronically stable.

There are three main video-teaching situations:

- 1) Large lecture theatre
- 2) Small group seminar
- 3) Individual access

Although the hardware they use may be similar each environment has its own requirements. The large lecture hall will need a mobile microphone for sound with a zoom remote control video camera or cameraman. Small groups can use an omnidirectional microphone and a fixed wide angle camera, while an individual may use a tie-clip microphone and a stationary camera.

Video Conferencing in the DELBERT Tutorial System:

Earlier in this chapter several on-line tools for getting input from participants were discussed. Feedback thus far was mostly asynchronous, text format, and set before the completion of the course. Open and closed questionnaires were the on-line input devices. Reflective feedback was accessed via e-mail web-survey submitted after the finish of the lesson. On-line interviews using video conferencing was another methodology used in this research to gain synchronous (live) information. This reflective feedback was intended to act as a means to support and cross reference data accumulated via the e-mail survey. The same set of questions e-mailed in the questionnaire set the foundation to the semi-structured interview.

Live text chat was used instead of audio, while the video images of the student and LED were seen on the monitor. This methodology was used for several reasons:

- The audio quality was poor and erratic on the (LAN) local area network.
- The interviews were conducted in public offices. Loud conversations would have been disruptive to others in the area.
- Although analogue audio dialogues could have been recorded (and later transcribed) it was decided to take out the extra step by simply saving the text chat as a .txt file (chapter 6).

The software used for this research was CU-seeme by White Pine corporation [5.6]. ISDN (Integrated Services Digital Network) lines and video equipment were not used in this study for two reasons; the high expense and the lack of availability with compatible software. Web-based desk-top video conferencing equipment was the logical alternative. Several web-based desk-top video conference packages were examined such as Connectix and Netmeeting. CU-seeme was the most robust tested offering a simple user interface with a live text chat window and white board (shared program window) in the enhanced version. The white board, although not used in this study, allows participants to place an image on the screen and synchronously interact with it by manipulating graphics and text. The modified file can then be saved for future reference. Connectix [5.7] hardware was the desk-top video camera used in the pilot study.

Web-Constructivist Principles:

The student is encouraged to actively reply to the questions during the interview session. Since an interview requires at least two participants the social exchange is understood. Multiple modes of representation is demonstrated by using video images and text combined. The student has a live text chat during the video conference as a means of getting reflective feedback to the LED.

4.5 Summary Discussion

Currently, the technical standard for Information Technology (IT) is word processing. This means that the default application is no longer the type writer. In the near future it will be video conferencing. Multimedia, networks, the internet and video conferencing are blending into one platform. A convergence of technology is being reached (Wilson 1996).

The on-line tools used in this study; e-mail, e-mail surveys, HTML forms, Javascript and video conferencing with live text chat were carefully selected

for this research. The prerequisites for what tools to adapt to a web-based learning environment were:

- The on-line tools should be client-side and not require any plug-ins or additional software for use over the web.
- The software needs to have a clear, simple interface for the student user.
- The tools need to be robust and reliable.
- The tools should be cross platform and operate on any browser

Each of the on-tools used in this study supports at least one of the Web-Constructivist principles below:

- Support the active construction of knowledge in the mind of the student. [HTML Forms]
- Embed learning in a social experience. [e-mail and video conference chat]
- Use multiple modes of representation (multimedia). [Javascript text & graphics windows]
- Support the sense of ownership and a voice in the learning process. [Javascript login & HTML Active Entry]
- Give the opportunity for reflection. [Web-survey & HTML forms posting of essays]
- Support interactivity with feedback, thus promoting motivation. [Javascript e-mail forms]

Applied formative evaluation is a methodology that supplies feedback to the LED from the participants. These on-line tools are used to produce the feedback from the student. In the next chapter a more detailed examination of this feedback methodology will be explored.

Several technologies were considered for this research but not used due to time constraints. A user interface that used artificial intelligence was rejected because of the need for expert modeling. This would make the shift from a student-centred design to a teacher-centred approach that would not support Constructivist learning principles (chapter 2) (Boyle 1997). Virtual reality was also considered as an interface design issue. This was rejected because of the Minimalists approach adopted by this study (chapter 3). Special plug-ins are required to run VRML (virtual reality mark-up language) applications (Brunner 1997). Voice interface was not used for the same reason. Finally, Javascript was used instead of JAVA since it is a client-side program and also runs without additional plug-ins (section 4.5).

CHAPTER 5: ILLUSTRATING THE PRINCIPLES AND PROTOCOLS:

THE DELBERT TUTORIAL SYSTEM

Objectives of the chapter

This chapter examines the functionality of the software application reduced in this research to illustrate the learning principles (chapter 2) and related communication protocols (chapter 3). Human Computer Interaction (HCI) issues of usability, generalisation, customisation and learnability are discussed. A user manual is presented as a means of highlighting the features that demonstrate Constructivist principles, communication protocols and applied formative evaluation (feedback) methods.

The reader should be able to:

- Recreate the web page design.
- Locate a tutorial feature in the software.
- Describe a tutorial feature's function.
- Define the student's expectations in using the system.
- Define the tutor's expectations in using the system.
- Relate the *how-to* tick box system to the software.

5.0 In Brief

This chapter has two purposes. The first section (5.1) will decompose the features of the DELBERT Philosophy Tutorial. This examination will take an HCI (human computer interaction) approach by looking at factors such as usability, generalisation, customisation and learnability. The second part of this chapter will produce a *how-to* user manual. The intent of this section aims to address the areas of concern with the initial learning curve for novice level IT experienced students. This is discussed in detail with the analysis of the case study results (chapter 6). The summary discussion highlights some of the differences between the two versions of the DELBERT (Digital Environment Learning-Based Evaluation Response Theory) Tutorial systems produced for the case studies in chapter six.

5.1 AN HCI EXAMINATION OF THE TUTORIAL DESIGN

The approach taken in this section of the report is to examine some relevant HCI principles and apply them to the DELBERT Tutorial system. Next, a page taken from the system will be closely analysed, literally from top to bottom, to justify various design decisions. A main source of information for the site's design came from the Yale University (U.S.A) C/AIM WebStyle Guide [7.20]. According to Dix (1995), HCI principles are examples of previous systems that have been proven and commonly accepted. This study focuses on learnability (clarity, direct manipulation and generalisation) and flexibility (task migration and customisation).

Learnability:

Certain prerequisites are needed for the student to have the ability to learn or gain knowledge through the DELBERT System. There must be a clear, consistent design. DELBERT has an uncluttered, logical organisation with content, which is relevant to the goals. The content is delivered in a positive fashion with text having user-centred phrasing. Over use of "don'ts and no's" have been avoided. With careful planning dead-ends or "under-

construction" pages have been eliminated. This gives the student direct manipulation so that every action is a legal operation which shows a positive result. Because of this the student can apply knowledge gained in one part of the tutorial (i.e. -the WEBLINKS Page) to another (i.e.-1st Solution Page) or generalise their actions. Through this predictability the user can determine the effect of the future actions based on past interaction history. They have the ability to synthesise a mental model of their expectations (Dix, 1995). These claims are supported by the results of the case study, the DELBERT Philosophy Tutorial (chapter 6).

Once a student has become familiar with the DELBERT system they can apply it to virtually any DELBERT tutorial. This learning system is not content driven, but directed through Web-Constructivist principles (chapter 2), web-based problem-solving seminar protocols (chapter 3) and applied formative evaluation methodologies (chapter 3 – section 2). As a result, this research can be applied to any subject matter that can be placed into a problem-solving scenario. This is another aspect of generalisation. Through the use of this *template design* structure a student can apply experience gained in one tutorial to another.

Flexibility:

Flexibility is the systems ability to adapt to the needs of the student. Passing the responsibility for the task between the user and the system to achieve the goal is called task migration. This is illustrated through any of the tutorials *Active* pages by the use of dialogue initiative, which allows the student to place input into the system, and change it (Dix, 1995).

Customisation:

One of the key points of the tutorial is that it can be customised. This can be done by designing an adaptive interface for the ascetics of the presentation or the delivery of the content. It can be modified by the

student to meet their own needs. This is not done with an artificial intelligence (AI) agent, but is directed by the student. The content of the lesson is created by the student from the essay submission and actual pages.

Page Layout Design:

The following illustrations (figure 5.10 and 5.11) are taken from the Yale C/AIM WebStyle guide [7.20] and supported by the text, "Creating Web Pages for Dummies" series (Lowe 1998).

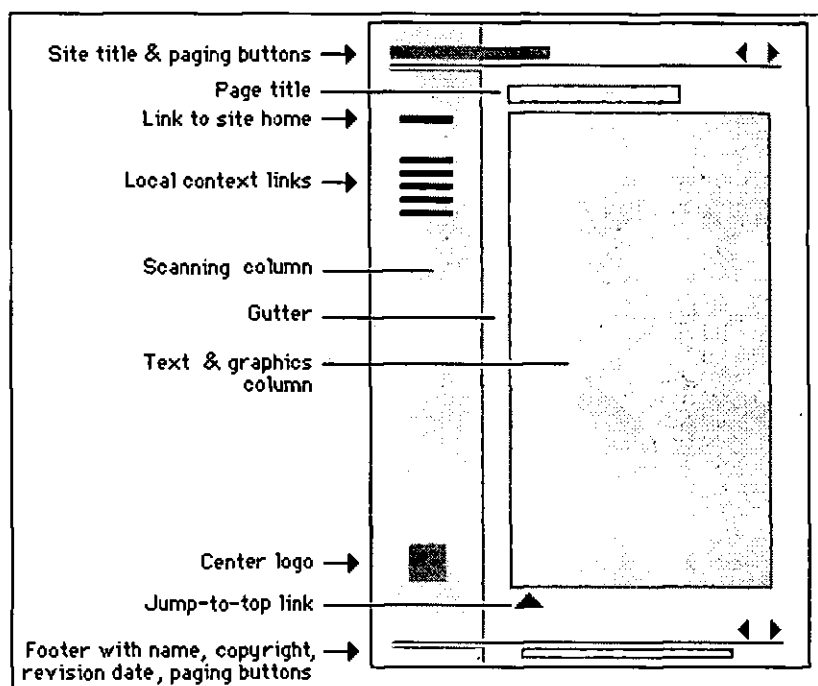


Figure 5.10 Yale style guide general

These guides were used to produce the template pages of the DELBERT Tutorial system because it supports currently accepted HCI screen interface issues for consistency and usability (Kilby 1998, Nielson 1998).

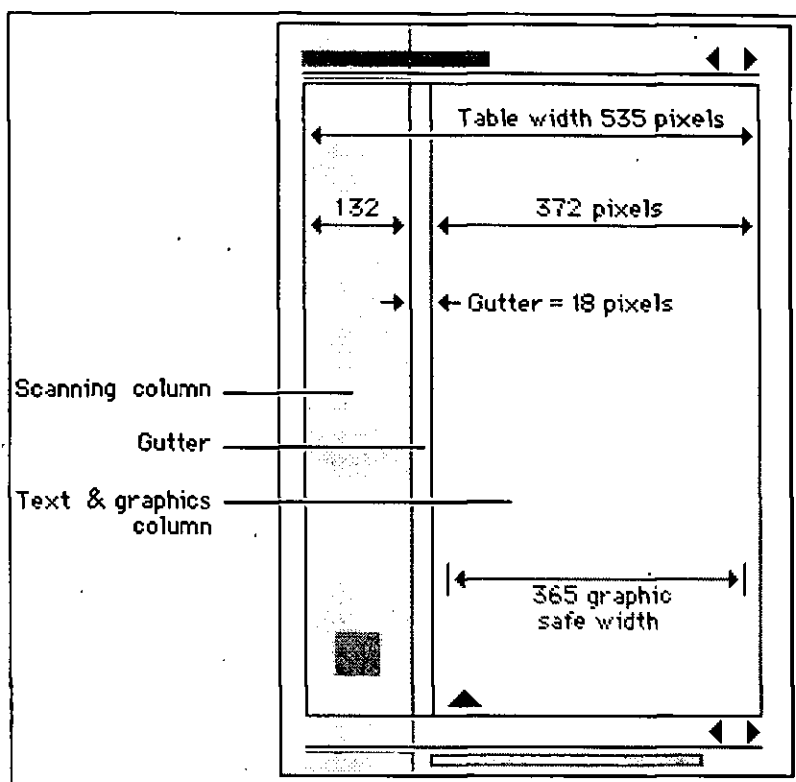
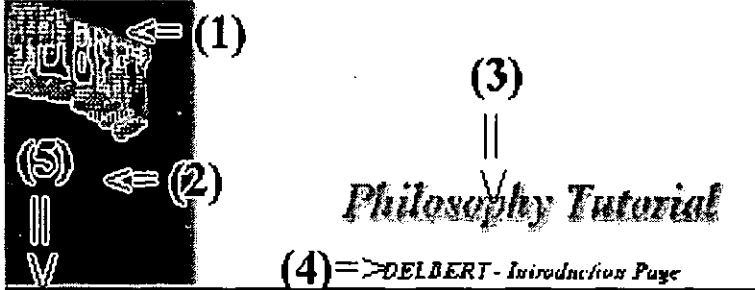


Figure 5.11
Detailed style guide

The following tables (7.20-top, middle, bottom) analyse the various features in the DELBERT template design. One of the goals of this design is to maximise download speed. For this reason HTML tables have been used as part of the template and not HTML frames. Figure 7.22 corresponds to features outlined in the table. The first column gives the physical location of the feature on the HTML page. Next, the name of the item is listed while the final column gives the function or description of the feature.


Below is the top third of a DELBERT Tutorial system template page:

		
LOCATION	ITEM	FUNCTION
(1) top-left	DELBERT logo	logo identity of the tutorial system
(2) left margin	vertical colour margin	used to separate the different subject matter for the case study (i.e.-IT = pink, Philosophy = blue)
(3) top-centre	Tutorial title	Labels tutorial subject, text colour matches left margin
(4) top-centre	Section title	Defines the HTML page & tutorial chapter / section in the protocol
(5) page width	Horizontal line	Sections off groups of data, near <i>top of page</i> link
<p>Table 5.10a Top third of a DELBERT page</p>		

Below is the middle third of the DELBERT Tutorial template page:

LOCATION	ITEM	FUNCTION
(6) top-right	Speed buttons	Graphical links to <i>home</i> , <i>glossary</i> and <i>help</i>
(7) top-left margin	Navigational menu bar in a table	Text links to chapters or stages in the seminar protocol
(8) top-left	Animated tick box	Current location marked
(9) top-left	Sub menu	Chapter sub-sections
(10) top-left	[page_of_]	Tracking navigation
(11) top-centre	<i>page down</i> prompt or scroll	Content <i>grouped</i> in 24 line sections (800x600)
(12) whole page	Help icons	remember, warning, tip & technical stuff
Table 5.10b Middle of DELBERT page		

Below is the bottom third of DELBERT Tutorial template page:

LOCATION	ITEM	FUNCTION
(13) throughout	 top	Animation & text link to menu bar
(14) throughout	<u>Standard hyperlinks</u>	Default browser links & cursor change
(15) throughout	Same as above	Links for e-mail
(16) bottom	<u>NEXT PAGE=></u>	Link to next suggested navigation path
(17) bottom	<i>footer</i>	- tile & URL - commented author - <i>updated</i> script - e-mail to SE/LED
(18) bottom	Hit counter	Scripting records visitors to URL data

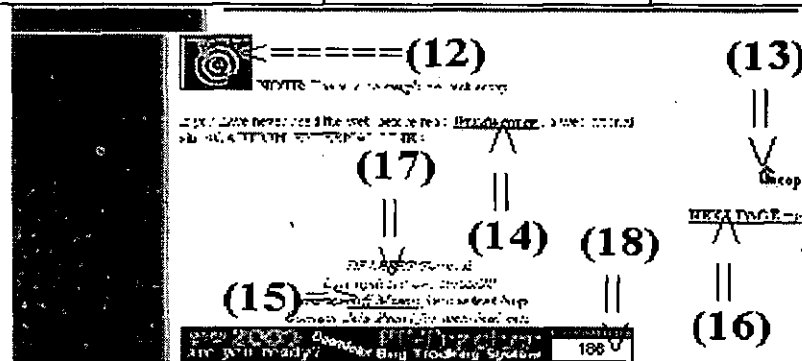


Table 5.10c Bottom of DELBERT page

Mentor Help Feature:

Upon the successful completion of the lesson the student is prompted to enter their e-mail address to an HTML form on the Mentor Help Activity Entry Page. This address is then posted to an HTML archive of past generation users of the DELBERT Tutorial system.

The intent of this resource is to give new students access to the experiences of their predecessors which supports the social and reflective elements of Web-Constructivism (chapter 2).

Hit-Counter:

It is worth noting that the hit-counter was added as a quantitative assessment tool. This was done as an optional feature offered to the subject expert by the LED. This feature was not tabulated for the case study results since applied formative evaluation was the focus of this research. Table 5.11 summarises the Philosophy tutorial (Appendix E) hits as of 20 October 1998.

URL CONTAINING COUNTER	SECTION OF TUTORIAL	REGISTERED # HITS
P_menu.htm -----	Introduction Page	179
P_start.htm -----	1st Draft Essay Submission Page	89
P_model.htm -----	2nd Draft Essay Submission Page	103
mentor_help.htm - - - - -	Help Page: Mentor Help Submission Form	33
feedback.htm -----	Feedback Page: * Web-survey * E-mail Help	59

Table 5.21 HTML hit counter

HTML Hit Counter: Summary

No conclusive evidence can be drawn from these statistics since there was no control placed on this survey. Both active and lurking visitors would register hits on the URL counter. Students, tutors, and LEDs alike would register hits. The only valid observations are that the greatest number of hits are on the Introduction page. The second largest number of hits is the page containing both the tutor's sample essay and student's first submissions. It is not surprising that Mentor Help and the Web-survey Page were the lowest since they were not actively used by the students during the case study. This conclusion is supported by the transcripts from the case study (Appendix E).

5.2 The DELBERT User Manual

This section can be printed separately or added as a first-time-user Javascript to the introduction page of any DELBERT Tutorial. The purpose of this section is to summarise and illustrate the many features available in the programme. It is also a response to feedback gained from the pilot case study (chapter 6) requesting help through the initial learning orientation.

Welcome to the DELBERT Tutorial system -

This software is intended to recreate the experience a student might have during a university seminar session. There is no single-correct-method for using the resources of this program. In fact, each lesson may differ slightly creating a new learning opportunity. The following job description itemises two areas:

1) What the student can expect from the system:

- Supply the student with a tutorial syllabus
- Supply the student with the coursework assignment
- Supply the student with necessary background information
- Supply the student with on-line research resources
- Supply the student with on-line communication tools to contact:
 - SE/LED for help and/or feedback
 - external contacts for research
 - peers for critical review
- Act as a tool to aid in the process of composing the essay

2) What the tutor expects from the student:

By effectively using the DELBERT tutorial system it will act as a tool or guide through the process of learning and writing the assignment. There is no single method to complete the specified essay or use the system. This is a suggested methodology which may be adapted to fit the user's personal

needs.

1. Clearly understand the tutorial goal or start problem
2. Clearly understand the related background information
3. Reflect on prior knowledge and experience related to the problem
4. Devise an appropriate web-based research plan
5. Collect and organise text and graphic information
6. Reflect on the information
7. Compose first draft essay.
8. Submit for peer review, discussion, collaboration, debate and/or argumentation
9. Revise / Reaffirm conclusions
10. Compose and submit second draft essay

THE DELBERT TUTORIAL HOW-TO-TICK-BOX SYSTEM:

Steps to use this tutorial system:

- 1) Read the action to be taken by the student.
(on-line version: click link to go to that section and browser BACK button to return to this form)
- 2) Read the desired results from the student's action
- 3) When the stage is completed tick the box.

It is suggested to the subject expert (SE) that a marking scheme be built into this student manual. Marks will be awarded for completion of each tutorial stage. Contact the tutorial SE or LED for the marking scheme of this lesson.

Note to Students:

On-line version of this checklist:

Save this HTML page locally as a method of recording progress through the tutorial system. When complete: 1) enter student e-mail 2) click submit button

Off-line version of this checklist:

Simply print this page to track progress in hard copy.

1) Tick each stage as completed 2) Pass into lesson tutor

STUDENT ACTION	RESULT FROM ACTION	☒
1. Read Introduction page	<i>Orientation of first-timers</i>	<input type="checkbox"/>
2. Read start problem & background	<i>Comprehend lesson goal</i>	<input type="checkbox"/>
3. Submit web-survey (start problem)	<i>Tutor reacts to feedback</i>	<input type="checkbox"/>
4. Research tutorial resources	<i>Compile data</i>	<input type="checkbox"/>
5. Research external resources	<i>Compile data</i>	<input type="checkbox"/>
6. Add data to Active Entry pages	<i>Data posted to HTML page</i>	<input type="checkbox"/>
7. Submit 1 st draft solution	<i>Public posting for review</i>	<input type="checkbox"/>
8. Critically review peer submissions	<i>New data analysed</i>	<input type="checkbox"/>
9. Use dialogue protocols	<i>Collaboration with peers:</i> - <i>reaffirm/reassess</i> - <i>virtual social exchange</i> - <i>construct knowledge</i>	<input type="checkbox"/>
10. Critically read sample solution	<i>Repeat No. 9</i> - <i>analyse sample style</i>	<input type="checkbox"/>
11. Submit web-survey (sample)	<i>Tutor reacts to feedback</i>	<input type="checkbox"/>
12. Submit Mentor Help e-mail	<i>E-mail is posted for help</i>	<input type="checkbox"/>
13. Access video conferencing	<i>Debriefing interview</i>	<input type="checkbox"/>
14. Submit Post-course web-survey	<i>Tutor reacts to feedback</i>	<input type="checkbox"/>
15. Reply to reflective web-survey	<i>Tutor reacts to feedback</i>	<input type="checkbox"/>
Enter e-mail: _____	<u>Click to submit results,</u> Thanks	<input type="checkbox"/>

Table 5.20

The DELBERT Tutorial

How-to-tick-box system

5.3 Summary Discussion

The DELBERT Tutorial system takes a *template design* approach. This is to say that from lesson to lesson the basic structure and navigation of the system will be similar. The LED will need to conduct an interview with the SE during the design phase of the tutorial development to adjust it for the particular needs of the student going into that specific lesson. This section highlights some of the differences between the IT Tutorial and the Philosophy Tutorial system discussed in the case studies of chapter eight.

The fundamental protocol discussed in chapter three for communication in a web-based seminar is used in both studies. However, some of the terminology was changed. For example, the sample solution for the IT Tutorial was called a sample essay. The functionality remained the same.

The HTML form scripting needed to be modified for the Philosophy Tutorial since the SE, Dr. Jeff Mason, wanted the second draft essay to be sent to a secured, private location. This was done by setting the form properties to a specific URL. Another variation sent the first draft essay to the top of the page containing the form for the second essay submission, as opposed to a separate individual page. Since the Philosophy assignment did not contain a large quantity of jargon, the Glossary and Weblinks active entry pages were combined. These differences, although minor, are significant to consider during the design interview to help the system meet the student's needs in using the DELBERT Tutorial system.

5.4 Critical Comparison to Current Systems

This section compares the DELBERT Tutorial system features to other current commercial web-based learning environment systems such as: LEARNING SPACE, TOP CLASS, WEBCT, and TOOLBOOK. The purpose of this section is to identify the gaps existing in these models and demonstrate how this research fills these weaknesses.

The following is a summary (Table 5.40) comparison of tools for developing

interactive academic web courses as described by the University of Manitoba, Ca. [5.5]. Each feature is itemised an expanded the table below.

The features presented in Table 5.40 and 5.41 can be grouped into these major categories. Corresponding numbers are assigned to each feature in the table.

1. Content production
2. Content presentation
3. Content support
4. Self assessment
5. Student interaction
6. Summative assessment
7. Active entry [addresses the gap in web-based system design]
8. Formative feedback [addresses the gap in web-based system design]

The area of content production can be seen as features that allow the author to generate content, quizzes and manage file organisation. Content presentation is controlled by password security while material presentation can be controlled by the on-line file management system.

There is an abundance of support features in current web-based learning environments such as: glossary, index, search, annotation, presentation areas. DELBERT's mentor help is a unique feature allows the participants to consult students from earlier lessons for aid in finding solutions to the contextual problems.

Self-assessment has a number of on-line versions such as; multiple choice and fill-in-the blank with feedback prompts offered or redirection path facilities. Student interaction is supported by a wide number of tools such as; presentation areas, e-mail, bulletin boards, forums and live chat/white boards. Although not a focus of this research summative assessment tools

are an area strongly supported by timed quizzes, on-line marking and grade management, generation of random quiz questions, student access to progress data and class summary marks. These features tend to focus on Behavioural approaches to content presentation and assessment. While Table 5.41 supports a Web-Constructivist approach.

The student ability to *actively* contribute to the content of the system is supported by *ACTIVE ENTRY* weblinks, glossary and Mentor Help facilities. Applied formative evaluation or feedback is an area lacking in the design of most systems according to this research. The DELBERT Tutorial system supports feedback gained directly embedded within the content of the system, and reflectively, after completion of the on-line course. The DELBERT system uses several tools to produce qualitative and quantitative feedback data, again addressing a gap in most current models. The following table highlights these strengths and weaknesses in its critical review.

Table 5.40 Critical comparison of current web-based learning systems [#] = the above categories					
GENERAL FEATURES	LEARN SPACE	TOP CLASS	TOOL BOOK	WEBCT	DELBERT
[1]No HTML knowledge required to develop course material	NO	NO	YES	NO	NO
[1]No HTML knowledge required to develop quiz material	YES	YES	YES	YES	NO
[2]Password and username security	YES	YES	YES	YES	YES
[1]Desktop based file management for uploading to server	NO	NO	YES	YES	NO
[3]Automated glossary tool	NO	NO	NO	YES	NO
[3]Automated index tool	NO	NO	NO	YES	NO
[3]Search tool for course material	NO	NO	NO	YES	YES ver 2.0
[3]Student can make private annotations of course material	NO	YES	NO	YES	YES

Table 5.40 Critical comparison of current web-based learning systems, continued. [#] = the above categories					
GENERAL FEATURES	LEARN SPACE	TOP CLASS	TOOL BOOK	WEBCT	DELBERT
[3]Student presentation area	NO	YES	NO	YES	YES
[2]Instructor can assign specific course material to individual or groups	NO	YES	YES	NO	YES
[4]Multiple choice self test tutorial questions - (automatic marking)	YES	YES	YES	YES	NO
[4]"Fill in the blank" self test tutorial questions - (automatic marking)	YES	YES	YES	YES	NO
[4]Customised feedback to tutorial questions	YES	YES	YES	YES	YES
[4]Redirect path of tutorial depending on question answers	NO	YES	YES	YES	NO
[6]Timed quizzes (graded with permanent mark retention)	NO	YES	YES	YES	NO
[6]On line marking and grades management of timed quizzes	NO	YES	NO	YES	NO
[6]Generate random set of questions from a pool	NO	YES	YES	YES	NO
[6]Student access and progress data available	NO	YES	YES	YES	NO
[6]Student can view own grades and compare to class summary data	NO	NO	NO	YES	NO
[5]Course Electronic Mail	NO	YES	YES	YES	YES
[5]Course bulletin board	NO	YES	YES	YES	YES
[5]Course chat facility	NO	NO	NO	YES	YES
[5]Logged chat	NO	NO	NO	YES	YES

The features that the DELBERT Tutorial system has built into its design process are highlighted in table 5.51. This is part of the contribution to knowledge that this research offers in the area of web-based learning environment design.

Table 5.41 DELBERT features not supported by other systems [#] = the above categories					
RESEARCH FEATURES	LEARN SPACE	TOP CLASS	TOOL BOOK	WEBCT	DELBERT
[8]Direct feedback: embedded prompt after content delivery	NO	NO	NO	NO	YES
[3]Research: mentor help	NO	NO	NO	NO	YES
[7]Active Entry: weblinks, glossary, mentor help	NO	NO	NO	NO	YES
[8]Reflective feedback: websurvey	NO	NO	NO	NO	YES
[8]Reflective feedback: desktop video conference interview	NO	NO	NO	NO	YES

5.5 Future Work

This section of the report examines the current version of the DELBERT Tutorial system and proposes improvements in these areas:

1. *Immediate software up-grades*
2. *Overall system modifications*

1) *Immediate software up-grades*

The programming modifications suggested for DELBERT 2.0 are to integrate new Javascript, add an initial orientation help system, modify the HTML form web-survey and add an annotation window.

Integrate new Javascript -

The current version of the DELBERT Tutorial system does not employ the use of Javascript tools explained in section 5.3 of this report. These on-line, client-side tools will be integrated into the next version of the software based on individual consultation of the subject expert by the LED for the next case study. Although this web-based tutorial system takes a *template*

approach, it is recommended that an initial interview occur between the members of the web-based learning environment team.

In the current version of DELBERT it is necessary for the student to use the browser RELOAD or REFRESH button to refresh the cache memory of the computer after submitting data. This allows the student to see their submission on the HTML page. A Javascript RELOAD button can be placed in the HTML page to perform the same task that keeps the user action focused on the tutorial interface.

Add an initial orientation help system -

Based on the case study results IT novices face an initial learning difficulty with mastery of the tutorial system navigation. DELBERT 2.0 will use a Javascript system to guide the first-time user to a show-and-do animation. The help tutorial will create a virtual walk-through of the collaborative problem-solving protocol. This added feature is intended to replace the *live* induction seminar held for the Philosophy students in the case study from chapter 6 and based on the user manual in section 5.3 of this document.

Modify the HTML form web-survey -

The current web-survey form for the student to complete after the presentation of major content elements in the DELBERT Tutorial system is composed of an HTML form-to-text file interface. The student is prompted to tick a radio button, drop down menu and fill in open text fields. The results are sent via the Microsoft FrontPage Web-Bot component to a text file located in the web server. A key word search engine (as found in the Edit / Find menu of most Microsoft products) can be used to tally the responses listed on the single text file.

DELBERT 2.0 will be more client-side oriented. Javascript will replace the HTML Web-Bot component forms. The structure of the question remains the same (i.e. -"Was the content clearly presented?"), but Javascript buttons

will send pre-formatted e-mails to specific subject-headed folders by using e-mail filters.

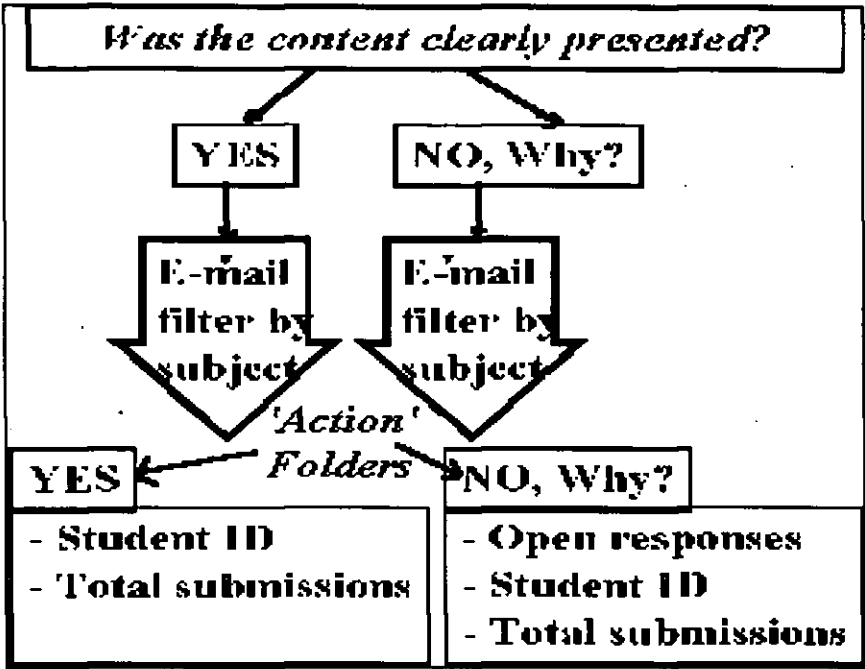


Figure 5.50 Future Work: e-mail system

Add an annotation window -

Section 4.5 for this report discussed the convergence of technology. The next version of the DELBERT Tutorial system will integrate two web technologies together; the web browser and the web editor. The browser

window is the interface in which the student navigates through the content. A second browser window can be called up through the use of Javascript (see section 4.3). In this case the smaller window, layered on top of the main content window, is an HTML editor. Notes can be typed, images can be

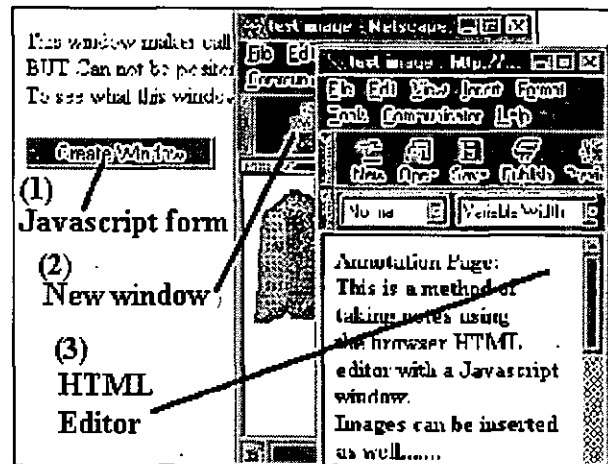


Figure 5.51
Annotation window

inserted, HTML links can be activated and saved locally in annotated form. These notes can then be publicly displayed for peer review and collaboration by FTP (file transfer protocol) to a web or LAN (local area network) server.

1) Overall system modifications.

The next phase of this research will improve on the methodology employed to alert the LED / SE about the status of filtered e-mail. When a pre-determined number set by the percentage of participants in the course) of e-mails reach a specific-subject-action-folder (see figure 5.2) an alert box, possibly written in Javascript, prompts the LED / SE to examine the messages. With the current system the LED/ SE must: a) open the e-mail software b) open the mail folder directory c) check the quantity of e-mails in the 'subject-filtered' folder. This is then compared to the class enrolment to produce a percentage of responses in that area. For example, if there were one hundred people enrolled in the lesson and two people (2%) reply: "NO

- the content is not clear", then an individual e-mail reply could suffice. If thirty people (30%) reply "NO" then an e-mail distribution list response would be in order. A major negative response of 50 or more people (50% or more) would bring about a change in the content in the tutorial or the presentation methodology of that material.

CHAPTER 6: RESEARCH METHODOLOGY: CASE STUDY ANALYSIS

Objectives of the chapter –

This chapter is broken into two parts; an explanation of the naturalistic (posteriori / inductive) research methodology employed and a critical analysis of the pilot case studies conducted. The reader should, at the end of this section, be able to:

- differentiate between scientific and naturalistic research methods.
- cite examples of the principles (chapter 2) and protocols (chapter 3) illustrated in the case study.
- cite examples of the on-line tools (chapter 4) used to promote applied formative evaluation methods.

6.0 In Brief

Mason (1996) states that the best method of getting feedback is through a combined/mixed approach, using open-ended and fixed response tools (i.e.- Likert scale and open essay) (chapter 3). Similarly, Biggs (1982) suggests a method for summative evaluation (section 3.5) using a combination of multiple choice, short answer and essay norm/criterion referenced tests. By adopting this procedure to research methodologies both qualitative and quantitative data (see section 3.5) is produced.

Rather than using a purely scientific (experimental) model with a control group to produce quantitative results, this report also supports the use of a naturalistic methodology (Hein 1997). This is similar to the social/anthropological (illuminative) approach for evaluation discussed in section 3.5. It is through the demonstration of the DELBERT Tutorial system and related principles/protocols in a variety of knowledge domains (subject matters) that this research methodology is supported. This perspective (an *a posteriori* position) is taken as opposed to solely using the traditional scientific method.

The events leading up to the main pilot study are discussed in this chapter. Section 6.21 examines the Middlesex Research Society (MRS) [8.31] website. Examples of the COM3120 and 2100 module websites [8.32 & 8.33] demonstrate various features explained in section 6.22. A website produced for a (live) seminar on web-based learning environments for the Centre of Learning Development (CLD) [8.34] at Middlesex University is explored in section 6.23, while a similar mini-pilot [8.35] was done for the language camp, Embassy Study Tours, in section 6.24.

The pre-pilot case study, the DELBERT IT Tutorial, was conducted with students from the School of Lifelong Learning and Education at Middlesex

university. These students were training to become certified teachers in the UK. The results are examined in section 6.3 of this chapter.

The DELBERT Philosophy tutorial was the main case study conducted on behalf of this research. Analysis on the data compiled from this examination is discussed in section 6.4. followed by a summary discussion in part 6.5 which proposes two principal contributions to knowledge produced by this report; the SOFA (Student-centred On-line Formative Activity) principle and the DELBERT interim-Theory.

6.1 Research Methodology

Educational technology, illustrated in distance learning, is a mix of "art and science" (Stufflebeam and Webster 1980) (chapter 3). As such, a cross-disciplinary research methodology is needed to assess the DELBERT tutorial case study. According to Hein (1995), research theories can be formulated along two methodologies; scientific (deductive) experiments and naturalistic/illuminative (inductive) approaches. The scientific-design looks at a situation as an experiment which needs to be broken into its component parts to be solved. The naturalists (illuminative) view the situation to be studied as a complex, interconnected set of conditions that need to be comprehended and described, rather than overly analysed. Table 6.10 polarises the attributes of the research methodologies.

COMPARISON OF RESEARCH METHODS		
Feature	Scientific method	<i>Naturalistic method</i>
Data produced	Quantitative	<i>Qualitative</i>
Approach used	Atomistic	<i>Holistic</i>
Perspective	Objective	<i>Subjective</i>
Setting	Laboratory model	<i>Real-world case study</i>
Nature of study	Hard	<i>Soft</i>
Results displayed	Confirmatory	<i>Explanatory</i>
Interpretation	Deterministic	<i>Responsive</i>
Analysis type	Analytic	<i>Descriptive</i>
Logic type	Deductive	<i>Inductive</i>
Research approach	A priori	<i>A posteriori</i>
Content type	De-contextualised	<i>Contextualised</i>

Table 6.10

Summary table: Research methods

This comparison can be discussed by examining these research elements; goals, tasks, references, challenges, reliability / validity, subjectivity / objectivity and outcomes.

Goals:

Research should begin with a clear and specific goal (Strauss 1990 et al.).

This study approaches the problem with a set of research questions from Section 1.2:

Research questions:

Can Web-Constructivism and collaborative problem-solving protocols support a web-based tutorial system using applied formative evaluation methodologies and on-line communication tools?

Can a set of principles be established to support an interim-theory (hypothesis) to guide the learning environment designer (LED) through the design process of a web-based learning environment?

Tasks:

The research task, taking the naturalist approach, seeks to find a way to describe the situation and interpret the data. Hence, a series of case studies to produce examinable interactions were created for this report.

Reference:

The data produced from these descriptions of the case studies should provide a narrative that is placed in context and illustrate emergent themes. The themes in this report are demonstrated through the principles, protocols (chapter 3) and theories (Section 6.5) developed in this research.

Challenge:

Unlike the scientist who looks to find the best method to measure and compare change, this report seeks to find the best method to record and describe the experience, or interpret the applied formative feedback of the participants.

Reliability/ Validity:

Verification is the basis of method employed by the *hard* sciences. Experiments are artificial constructs by the scientist to demonstrate their hypothesis in a controlled fashion that will allow the procedure to be replicated (Elton 1982). In an effort to establish a laboratory-type setting in the interest of increasing reliability, the scientist modifies the situation studied to such an extent that the results may need translation before they can be applied to practical, real-life situations (Hein 1997). For this reason the DELBERT Tutorial case study takes an applied formative approach to its research methodology. To demonstrate the validity of this research it

should be possible for anyone to replicate the *learning shell* templates produced using the principles and protocols developed in this report (chapter 3).

This study uses an a posteriori (inductive) approach that goes from the effects (instances of use - i.e. the DELBERT case studies) to the causes (the principles and protocols to create these case studies) that ultimately produced the DELBERT (Digital Environment Learning-Based Evaluation Response Theory) interim-Theory and the SOFA (Student-centred On-line Formative Activity) principle (Section 6.6).

Subjectivity and Objectivity:

Through the applied formative evaluation methods discussed in chapter 3 both subjective and objective data are processed and examined. The scientific-design methodology attempts to objectify (detach) the researcher from the topic. The way in which problems are framed, the methods used, and the manner in which reports are written are all intended to render the work independent of the perspectives, idiosyncrasies, beliefs or prejudice of the scientist conducting the experiment. It is hoped that anyone with similar training, given the same situation, could repeat the research protocol, observe the same phenomena and reach the same conclusions (Hein 1997). This research shares this hope, but not the scientific-design methodology as a whole.

This report supports the naturalist model of accepting the researcher's embedded participation and attempts to capitalise on the researcher's own experience and expertise. The on-line tools (chapter 4) used to prompt students for feedback dynamically involve the LED/SE in the research process.

The analytic methods favoured by this approach and used in this study are; developing categories that emerge from feedback (figure 4.2), develop taxonomies (chapter 7) and produce summary narrative descriptions (Sections 6.3 and 6.4). All of these methods require an active, cognitive input from the researcher, which once again, supports the principles of Constructivism (chapter 2), the backbone of this report.

It is the ability to argue about feedback that is one of the great advantages of any research or evaluation activity involving humans (Hein 1997). Using the feedback can produce changes in the tutorial system that will provide insight into understanding the meaning behind the student's comments (Figure 3.11). Although the feedback is subjective, in the sense that it is submitted by individual students (not as a group consensus - except in pre-pilot studies [8.34] and [8.35]) it is reliable and valid.

Outcomes:

This report produces outcomes that are valid for both scientific and naturalistic research methods. Scientific-design approaches are intended to demonstrate casual connections, to confirm that "factor A" necessarily causes "outcome B" (Hein 1997). This is discussed in chapter 7 of this report with the Error Elimination Approach to evaluation. Hard, quantitative statistics are also produced from on-line tools (chapter 4) in the form of e-mail surveys. Javascript (section 4.3 - example 8) can, in fact, graphically illustrate these statistics.

Summary:

The naturalistic methods of this research are not intended to make a contribution to one overriding, generalised explanatory scheme, but to probe in-depth the meaning of the particular situation being studied, as a contribution to a larger, general understanding. It is this perspective from

which this research makes a petition towards a contribution to knowledge in the area of educational technology.

6.2 Events Leading to DELBERT

The purpose of the case studies is to illustrate the principles and protocols described in earlier chapters. These studies provide data for the learning environment designer (LED) to modify the applied formative evaluation methods (chapter 3) established in this research.

The following events are examples of related mini or pre-pilot case studies conducted in relation to this overall research. They are: The Middlesex Research Society (MRS) [8.31] website, the COM3120 [8.32] and COM2100 [8.33] educational multimedia sites, the Centre for Learning Development / Electronic Learning Forum (CLD/ELF) presentation site [8.34] and the Embassy Study Tours Camp [8.35] case study. These are not presented in chronological order, but in progressively increased use of on-line tools combined in full for the pre-pilot (the DELBERT IT tutorial for Education students [8.37]) and full pilot study (the DELBERT Philosophy tutorial [8.36]).

6.21 The (MRS) Middlesex Research Society Web site

This early attempt at producing a website had two goals: create an on-line collaborative environment for all researchers across Middlesex University and create an e-mail HTML template allowing new MRS members to easily produce a webpage. The elements developed in this site for collaboration were:

- MRS members listed by school, surname index and/or search engine
- Each member had a place on the web for personal details and research publications for peer/expert review
- An events page to display results of group activity (i.e. - [MUCORT] Middlesex University Conference On Research and Technology)

The other key feature developed for this site addressed the need to have a simple methodology for new members to post a web page. Since most new members were IT novices, but had e-mail accounts as students of the university, an e-mail HTML template was created. When a new student joined MRS they were sent an e-mail which had a "fill-in-your-details" HTML template page (Appendix C). New members simply had to delete some text and reply with their own details. This e-mail was then copied into a simple text editor (NotePad) and saved as an HTML document. It was then FTP'ed (file transfer protocol) into the university server. At that time, the Alpha server only supported text and still graphics as highlighted by the Middlesex University World Wide Web Guidelines - Central Pages Version 2.0 14/5/96. A comparative set of guidelines are seen in the Multimedia Development Guidelines for the Natural History Museum, Issue 3 - 6/2/96.

Summary:

Less than 25% of the new members replied for a web page. Although the introductory e-mail (Appendix C) included a *how-to* section, the feedback gained from informal interviews stated that: "The HTML tags were a bit too much and confusing...(for the IT novice)." A paper version of this user manual was produced which had the sections to be deleted and replaced with new data highlighted in BOLD ITALIC font. Follow-up interviews indicated that this was helpful. Follow-up research was not conducted due to changes in the university administrative structure.

Case Study Summary Table	
Purpose of study:	1. Create web-based collaborative environment 2. Develop e-mail system for delivering HTML templates
Methodology:	Informal debriefing, focus groups
Result:	[http://www.mdx.ac.uk/www/researchswoc/mrshome.htm] MRS orientation user manual was produced. Minor participation from MRS membership.

Table 6.21 Case study summary

6.22 Educational Multimedia Classes (COM3120 and COM2100)

During the second term of the 1997/98 academic year two websites were produced on the webserver developed for this research (<http://skip.mdx.ac.uk/>). Microsoft FrontPage was selected as the software to produce this webserver for several reasons. First, it was strong in the composing collaborative discussion groups. Secondly, FrontPage was known to be a robust webserver for the Dell60 Pentium processor, using a Windows95 operating system, which was available for the study. Both of these features were necessary for the development of the software towards the final system. One of these features, Guestbook technology, was included in the Educational Multimedia site (Appendix G). This HTML form allowed the student to enter text into the field on the HTML page and submit it to the same page for public viewing (see chapter 4.2).

Summary:

Only twenty percent of the sample group (seminar group D) actively participated. Informal post-course group interviews were conducted to assess student's views of the website. It was concluded that because the use of the website was not built into the marking scheme of the course and participation was not mandatory, regular participation was not necessary. Future work in this area should be included as part of the module syllabus

with a point value assigned for participation. This will ensure a higher percentage of active participation.

<i>Case Study Summary Table</i>	
Purpose of study:	1. Test functionality of guestbook forms for supporting collaboration 2. Investigate principles and protocols in small scale setting
Methodology:	<ul style="list-style-type: none"> • Examination of guestbook entries • Debriefing interviews
Result:	[http://skip.mdx.ac.uk/teaching/COM2100.htm , COM3120.htm] – Minimal yet robust use of HTML forms in a collaborative setting

Table 6.22 Case study summary

6.23 Centre for Learning Development (CLD) presentation / workshop website:

The Guestbook form technology used in the COM3120 and COM2100 website demonstrated the power of a collaborative web-based environment. The problem, as with most open-chat forums or discussion groups, was that there was no real structure guiding the learning process. This "discovery" approach (chapter 2) is a student-centred teaching strategy that empowers the participant to direct their own learning process (Papert 1988). A variation of this strategy is demonstrated on the electronic learning forum (ELF) website (Appendix F).

The seminar was broken into two parts. First, a PowerPoint lecture was conducted on the principles and protocols discussed in this research (chapter 3) which were converted to HTML pages with sound (as .wav) files embedded into the background. The student clicks on a button to play the speech associated with the scrolling Javascript text at the bottom of the web browser.

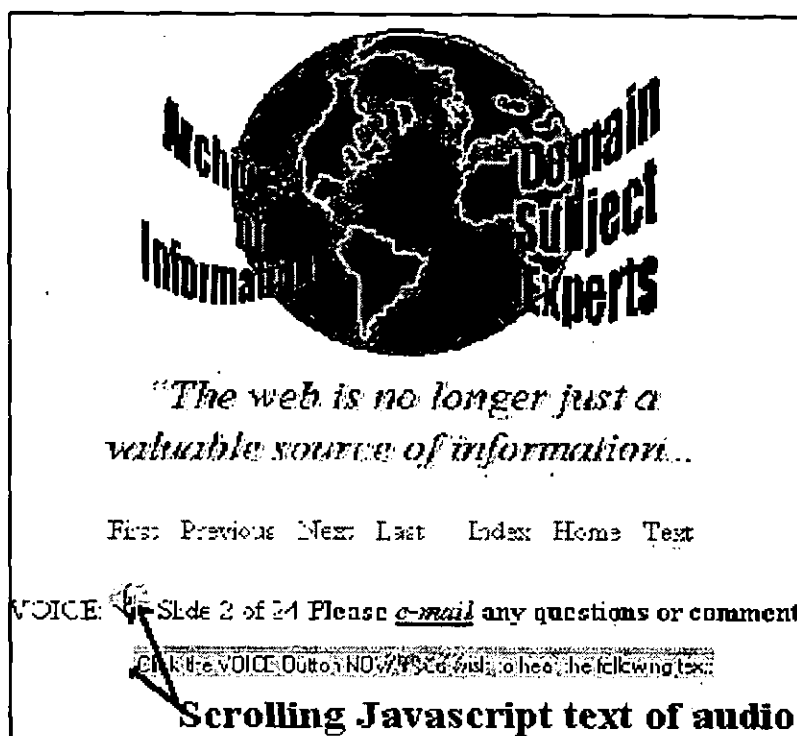


Figure 6.230 Example .PPT slide

The second part of the seminar was a hands-on Constructivist approach (see chapter 2). The sample group of seminar participants were over forty Middlesex University employees interested in web-based learning (87 on the e-mail list). Academic and technical staff were represented from several schools and campuses throughout the university. There was also a wide range of IT experience within the sampling as well. The workshop was broken into two parts.

Part 1:

First, groups of five or less (with mixed IT experience) were formed around each computer in the lab. Next, the participants were presented with the seminar protocol developed in this research (chapter 3). Then, the groups were introduced to the workshop start problem pictured in figure 6.332. The groups were given ten minutes to form a consensus towards a solution. They verbally argued their points with enthusiasm.

Question:

Does the water level go up, down, or stay the same?

Background:

A person is standing in a small boat 2 meters long by one meter deep by one meter wide. He throws the 15 cm cube of metal into the swimming pool. Does the water level of the pool change? Discuss.

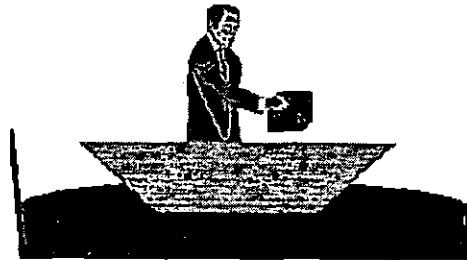


Figure 6.231
Start Problem of the protocol

Part 2:

The goal for this phase of the workshop was to recreate the mini-seminar which occurred around each monitor in a *live* discussion digitally over the web. Groups created nick names (an alias) for a continued on-line debate. This web-based problem-solving seminar continued for another ten minutes with strong interest.

Summary:

Informal interviews and a paper questionnaire produced strong positive results. Participants felt the demonstration illustrated the principles and protocols discussed in the first part lecture (from chapter 3) and produced an effective on-line seminar debate. There were no hits to the on-line version of the paper questionnaire.

<i>Case Study Summary Table</i>	
Purpose of study:	<ol style="list-style-type: none"> 1. Test system functionality 2. Test small version of DELBERT Tutorial system with no applied formative evaluation methods
Methodology:	<ul style="list-style-type: none"> • Post interviews • Web-survey
Result:	The software worked well with the number of users, positive feedback from interviews, no web-survey response. Positive illustration of principles and protocols.

Table 6.23 Case Study Summary

6.24 Embassy Study Camp

The hands-on phase of the CLD/ELF workshop was presented to the students attending the Embassy Study Tours camp. Eighty students enrolled in a summer camp for English as a foreign language repeated the mini-DELBERT study using the same start problem (Figure 6.331 above). The students were male and female teenagers from mixed European countries (Italy, France, Poland and Spain). IT literacy varied from novice to experienced. The same protocol was followed as in the CLD/ELF study.

Summary:

Despite the fact that the students did not have strong English skills the same results were reached with this study. Informal interviews were conducted at the conclusion. The students gave positive feedback about their experience.

<i>Case Study Summary Table</i>	
Purpose of study:	1. Test system functionality 2. Test small version of DELBERT Tutorial system with no applied formative evaluation methods
Methodology:	Debriefing focus groups
Result:	System crash: too many hits in too short a time for the PC server used. Strong illustration of oral and on-line collaboration principles/protocols

Table 6.24 Case study summary

6.3 The DELBERT IT Tutorial Pre-Case Study

This discussion of the DELBERT IT Tutorial Pre-Case Study is broken into three sections; case study goals, case study methodology and summary discussion.

6.3.1 Case Study Goals:

The purpose of this pre-pilot study was two-fold. First, from the technical side, it was a debugging session. The intent was to discover any problems with the HTML pages such as images not loading and/or slow download speed. Second, from the HCI (Human Computer Interaction) perspective, produce evidence of usability by surveying the student's global impression of the system. It was decided due to time restraints not to test all of the features of the system. The Active Glossary, Weblinks and Mentor Help features (see chapter 5) were not examined.

This case study was also intended to validate the principles and protocols developed through this research. The seminar problem-solving protocol (chapter 3) begins with a start problem.

Find and evaluate three websites of education organisations in the UK that could be used to support you as a new teacher in IT capability based on the National Curriculum.

Steps:

- 1) Conduct a web search using various key words and methods.
(i.e. - Keywords: education, UK, teacher training, IT, etc.
E-mail Contacts: List individuals you have contacted that may be helpful with this problem from government agencies, universities, school systems, etc.)
- 2) Bookmark the websites
- 3) Compare the sites and evaluate their strengths and weaknesses from an educational perspective as it relates to your needs as a teacher.
- 4) Establish a criteria based on this research for an effective educational website.
- 5) Produce a ranking of the sites (i.e.- best to worst) and justify your choice.

Table 6.30 IT start problem

6.3.2 Case Study Methodology

The study was conducted on 28 January 1998 from 11:00 am to 1:00 p.m. at the Trent Park Campus of Middlesex University in London, England. The web server (Dell60 Pentium) was located at the Bounds Green campus and linked via the SuperJANET local area network (LAN). The Trent Park PC lab (room B8) was equipped with 100 MHz Pentium processors. The university network is Novell 4.0 running off a Windows 3.11 operating system. The two-hour session was video taped with the participants knowledge. The following discussion is a result of reviewing this analogue tape. The test subjects were two adult women from the School of Lifelong Learning and Education (year three) at Middlesex University who were preparing to become certified teachers in the U.K. Their IT (information technology) experience was at an intermediate level.

The study began with an introductory orientation which was broken into two segments. The first part was an (off-line) OHP (over head projector) presentation. The second part was an on-line walk-through of the

• DELBERT Tutorial system.

Part 1: Off-line Lecture -

The introductory lecture consisted of three main parts; the web site map, the seminar problem-solving protocol and the explanation of on-line tools. To get an overview of the navigation strategy, the site map from the DELBERT Help system was used to show the various HTML pages and their functions in comparison to the whole system. An explanation of the problem-solving protocol (chapter 3) proposed by this research was detailed. This was compared with the site map to aid navigation orientation. Finally, a description and explanation of the on-line tools, e-mail (section 4.2) and HTML forms (section 4.3), was given using screen grabs converted to OHP slides. After reviewing the video tape of this part of the presentation it is suggested that an animated help system (section 7.2) be added to the DELBERT Tutorial system help file.

Part 2: The On-line Presentation -

The on-line portion of the presentation reinforced the first part. The two topics discussed were DELBERT user strategies and Navigation Tools in the DELBERT Tutorial system. The DELBERT (first-time) user strategies recommended to maximise the educational value of the environment are:

- set the Home button on the browser to the DELBERT URL (uniform resource locator - Internet address)
- use the bookmark feature
- use the NEXT PAGE=> link at the bottom of each page.

Throughout the tutorial help icons, such as figure 6.42, warned the student that important material followed. Instructions were given to the students to set the browser Home button to the DELBERT Internet address to be used as a "return-to-home" aid when they felt lost. Alternatively they were shown the book marking feature in Netscape, and use the browser BACK button.



Figure 6.30
Help Icon

The NEXT PAGE => link at the bottom of each HTML page was not in the original design. Since the DELBERT Tutorial system implements a non-linear

teaching strategy a linear navigation device was not considered. However, pre-pilot focus groups suggested the need for a simple method to guide the novice user through the problem-solving protocol. Once the student is accustomed to the system they can navigate freely (i.e. start problem <=> weblinks <=> first solution...) which is a recommended usability heuristic (Kilby [8.41]).

The navigation tools for the system were also discussed. Internal navigation is the movement that occurs from one HTML file to another within the [http://skip.mdx.ac.uk/DELBERT/] web server directory structure, while conversely, external links are URLs that reside on a different server. It is important for the user to realise when they have left the tutorial and have entered the Internet. This is discussed in detail in chapter 5 of this report. During this pre-pilot study external links were searched and explored, however, because of the two hour time restraint news groups were not used.

6.3.3 Video Transcript Summary

Appendix D contains the annotation from the second hour of the session. Students actively used the system and spoke to each other. The intent of the full study is to replace this *live* chat with on-line text correspondence and video conference text chat. This will then illustrate the on-line formative protocols that this research is putting forth as a contribution to the area of educational technology.

There were two main threads to the discourse; technical problems and usability concerns. The technical issues were minimal. A bad link was discovered in the body of the text but could be by-passed using the menu. A javascript alert box came up but did not hinder the delivery of the content.

One item was established as a major concern. The university network ran very slowly which caused WWW searches done with conventional search engines (i.e. - Yahoo, Alta Vista, etc.) to be impractical at times. Students felt the download speed of the tutorial files to be acceptable.

Usability issues came from the student's inexperience with the system and an unfamiliarity with using a browser on the internet. One concern worth noting was a request for an annotation feature. The ability to have on-line note taking was seen as desirable.

Finally, it is felt, that this dialogue would be a useful element to the system help feature. The addition of a F.A.Q. (frequently asked question) page is recommendation for the next version of the DELBERT Tutorial system.

6.3.4 Summary

The following conclusions from this pre-pilot study can be grouped into two areas; adaptations to the case study methodology and adaptations to the software for the tutorial system. The initial goals of getting usability feedback was successful (Appendix D). Based on an informal interview at the end of the pre-pilot study, the students felt they understood and correctly used the tutorial's protocols and principles. The following points are suggested adaptations to the case study methodology based on the comments of the participants in the debriefing interview:

- There was not enough time to fully use (test) the system, therefore, a proper study conducted over a full term is needed.
- The initial orientation to using the system was complex. A set of

prerequisites (i.e. - netskills, IT skills, etc.) would be suggested by adding links to on-line tutorials which would aid in the indoctrination process.

- Take steps to prevent system strategies from becoming obsolete (i.e. - written for Netscape 3.0, while 4.0 is the current default browser at the university).
- Use the post-course e-mail survey in the full case study.

The main adaptations to the software for the DELBERT IT Tutorial system involve adding Javascript (section 5.3). The annotation window Javascript (chapter 5) allows the student to take notes in the Netscape HTML editor. This can be saved locally or publicly on the network or FTP'ed (file transfer protocol) to the webserver. Inserting a link in the main menu bar for opening a new browser window (customised to stay on top), written in Javascript (section 4.3), would allow the student to have easy access to the start problem at any time in the tutorial. Currently it takes several clicks to return to the specific spot on the Start Problem HTML page.

A Javascript Reload button placed directly on the HTML page would be more effective and easier to use than clicking on the browser menu bar. This will help the students see their new submissions. The DELBERT Tutorial pre-pilot case study was a worthwhile step leading towards the next section of this report, the DELBERT Philosophy case study.

Case Study Summary Table	
Purpose of study:	1. Debug software 2. Get limited usage feedback
Methodology:	Solve an IT in Education Problem: - video tape session for analysis - debriefing focus group
Result:	HCI problems were identified and corrected. Limited principles and protocols were positively tested.

Table 6.340 IT Pilot Case Study Summary

6.4 The DELBERT Philosophy Tutorial Case Study

This discussion will follow the same structure as the pre-pilot DELBERT IT Tutorial case study. First, the goals of the study will be addressed in section 6.41. Next, the methodology will be examined in section 6.42 and, finally, the summary discussion will be in section 6.53.

6.4.1 Goals of the DELBERT Philosophy Case Study

There were two threads to this case study; the School of Philosophy and the educational technology perspective. Dr. Jeff Mason [8.51], lecturer for the Philosophy 1500 course which supplied the subjects, was interested in the DELBERT Tutorial system as an on-line writing tool by comparing the results of the participants using the tutorial to those students not using the system to solve the start problem (Figure 6.410) (the first essay assignment on Sartre for the course). Although interesting from the educational side, it is not the focus of this report and is not discussed.

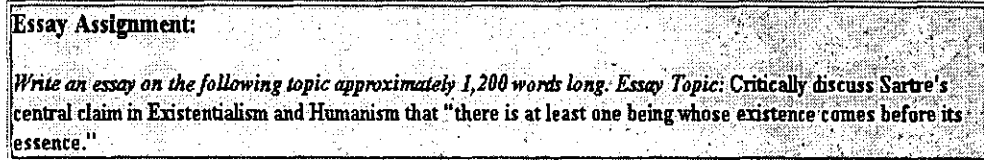


Figure 6.410 Philosophy Pilot Study
Start problem

The educational technology goals were concerned with verification of the principles and protocols developed in this research to design and use the DELBERT Tutorial system (section 6.2). A sub-goal was to test the tutorial software and video conferencing equipment.

The educational technology goals could be further specified as technical and educational. The technical goals were that; (a) The software would successfully and consistently function from different operating systems. (Middlesex University uses a Novell 4.0 network over the SuperJANET

LAN (local area network) supporting Windows 3.1 for the students and most staff using PC's (with some Windows95 and WindowsNT staff users as well), Mac and Unix O.S. (operating systems) were also used but in the minority. This study focused on PC's alone. (b) The software would be usable from various internet browsers. (Netscape Navigator 3.0 and Communicator 4.0 were the default. The software was also successfully tested on Microsoft Explorer 4.0, Mosaic and the text-only browser Lynx) (c) The on-line feedback tools; e-mail, HTML forms and video conferencing would successfully function.

The educational goals for the case study specified that; (a) students would understand the protocol used in the tutorial system (chapter 3). (b) students would utilise the methodologies set for the on-line communication tools (chapter 3). (c) Students would use the web-based resources available through the system (i.e. - internal and external links as discussed in the transcript answers #5 and #8 in the pre-pilot study). (d) Students would use on-line communication tools to contact each other, the subject expert (Dr. Mason) and the LED (learning environment designer: Anthony "Skip" Basiel). It is worth noting that assessment of measurable learning outcomes (summative assessment) was not a goal of this study. The reason for this is due to time constraints for the case study. In addition, this research supports a peer review form of assessment to measure the difference from the start essay to the last essay submission as a means of gauging student improvement.

6.4.2 Research Methodology

This section of the report will; provide background information on the sample group, provide a technical background description and supply a summary analysis of the data collected.

Sample Group:

The sample group was comprised of five students entering essays (Appendix E). There were three males and two females that were second year Middlesex University students enrolled in the Phil1500 course. Their computer experience was at a novice level.

This sample group was chosen because Dr. Mason had expressed an interest in this research after being contacted by e-mail about the DELBERT software prototype. After several meetings it was decided that the second term of the 1997/98 academic year offered an opportunity to test the software and protocol system on the Phil1500 students. A short presentation was made at the first day of class to generate a list of participants. An e-mail distribution list was created to keep students informed about the study. The sample group was further narrowed by those student's choosing to study Sartre over another philosopher to write their second essay assignment for the term. (Dr. Mason was contacted by students not choosing Sartre for their assignment expressing disappointment in not having the opportunity to use the DELBERT Tutorial system for their coursework.) Students choosing to do their second Phil1500 essay on Sartre were invited to a hands-on orientation lab seminar. This one-hour training session was repeated for three weeks after each philosophy lecture.

Technical Background:

The three on-line tools used to gather feedback data were e-mail, HTML forms and video conferencing. E-mail could be accessed via Netscape Communicator and the Alpha server mail by students or Pegasus mail for the staff. HTML forms retrieved data via Web-Bots in the FrontPage server [<http://skip.mdx.ac.uk>] that was created for this research. The data would then be placed onto an HTML page or text file within the server. Video conferencing was conducted over the Novell 4.0 network using the university LAN via SuperJanet. The server's permanent I.P. number for

video conferencing is: 158.94.59.179 . The software used was CU-seeme 1.0 (black and white video). The hardware was a desktop Connectix camera. It was decided to not use an ISDN connection due to cost. It was also hoped to avoid restrictions for future studies for software and hardware compatibility. A more detailed analysis of the on-line tools is in chapter 4 of this report.

Installation of the video conferencing hardware and software was conducted at the Tottenham Campus. The original plan was to do the on-line interviews between the LED (at the Bounds Green campus) and individual students in Dr. Mason's office in Tottenham. However, the hardware would not run on the Windows 3.1 network operating system (contrary to what was written in the Connectix user manual). A fixed IP (internet protocol) number was also required for the PC which had to be arranged through the university network technicians. The video conference camera and software was moved to an office next to the Tottenham computer reception area. William Prescott [8.52], a computer technician, had a PC running Windows95 which was available for the video conference interviews. A temporary account was establish for the study: Video1, password: skip .

Summary Analysis of Feedback:

The following summary of the data from the files in table 6.5 describes the feedback from participants in the study. This is in keeping with the Naturalistic research methodology discussed in the beginning of this chapter (section 6.1). The data was produced from on-line tools and no *live* surveys or interviews (as in the pre-pilot study). This analysis follows the suggested seminar protocols (chapter3) to work from the start problem to submission of the second draft essay. Since the number of responses is low, quantitative statistics produced in this case study was small. The full study will yield hard data from the web-survey tools.

Start Problem -

When prompted to give a YES / NO response on the clarity of the assignment only one (Remote Name:158.94.181.106) of the four students (25%) indicated that the start problem was unclear. All of the students (100%) responding indicated that the background information was understandable. Only Remote Name:158.94.180.105 submitted a comment in the open text field reply.

First and Second Draft Submissions -

First draft essays can be read in Appendix E. The following table 6.420 summarises essay submission data.

STUDENT NAME	E-MAIL@mdx.ac.uk	1st Essay: TIME/DATE	2nd Essay: TIME/DATE
<i>Krista Stevens</i>	KS139	13:15 / 12-04-98	14:57 / 12-05-98
<i>Melanie Harper</i>	MH214	15:21 / 27-04-98	15:39 / 12-05-98
<i>Jacob Kalinski</i>	JK130	23:32 / 28-04-98	11:06 / 12-05-98
<i>Malcolm Raymond</i>	MR168	no entry	14:55 / 01-05-98
<i>Bill Kerr</i>	BKerr@AOL.com	no entry	15:59 / 09-05-98

Table 6.420

Philosophy Pilot Study: participants

Sample Essay Survey Response -

The web-survey for the Sample Essay produced two responses, both expressed the sample essay and background content as being clear. No open responses were submitted.

Filtered E-mail Help -

A single request for help with the system was posted to the filtered e-mail help system from MALCOLM RAYMOND <MR168@mdx.ac.uk>. His query about not being able to see his submitted essay was easily solved by

reminding him to use the browser RELOAD button. A reply message (section 6.63) was sent personally by e-mail and posted to the HTML page: Upon examining the page it was found that Malcolm's essay was posted twice which confirms the problem was not reloading the HTML page.

Post-course E-mail Survey -

The sole post-course reply (section 6.53) from KRISTA STEVENS <KS139@mdx.ac.uk> supports the observations made upon scanning the tutorial pages. The student's experience of using the system, although useful, did not take full advantage of the web resources available. This could have been due to several factors; time constraints, inexperience with using the web and the fact that it was not a required part of the assignment for marks.

Video Conference Interview -

It was hoped that the video conference interview (section 6.53) would support the findings from the e-mail survey and fill in the gaps of any information missed. The session was conducted on 18 May 1998 from 1 -2 p.m., and 26 May noon -2pm between Bounds Green and Tottenham campuses. Pre-set interview questions were cut-and-pasted into the synchronous text chat window in the CU-seeme software and saved as text files (which can be done automatically with the enhanced version 3.0 of CU-seeme). Video windows were simultaneously running with the text chat

Hi! Can you see me OK?
I have a few quick question, are you ready?
Did you reply to the questionnaire after the assignment essay and the sample essay? If not why?
What internet tools did you use to research your essay? Search engines, News groups, E-mail an expert, or something else? If none why?
Did you submit anything to DELBERT besides the essay? (i.e. - A new web link) If not why?
Did you read other student's essays? If not why?
Did you contact other authors about their essays? If not why?
Did you contact Jeff or myself about DELBERT? If not why?

Table 6.421

Video Conference Interview

box during the interview. Five students participated; William Kerr, Jake Kalinski, Krista Stevens, Tom Berwick and Christian Roberts. Table 8.621 below contains the set of questions that were used for the interview. This was a semi-structured interview style. They were set by a meeting with Jeff Mason. Ideally they should be set from the results of a focus group meeting (off on-line) with actual students and subject experts.

The same conclusions are drawn from this formative evaluation as reached by the e-mail survey. (Post-course E-mail Survey results above).

DELBERT Active Entry Pages Submissions -

There were no submissions to Weblinks / Glossary or Mentor Help active entry pages for this case study.

E-mail Feedback from the Internet -

Section 6.63 contains samples of e-mail replies sent out at random over the three year period of this research requesting feedback on the research and the tutorial system software. In summary, it was felt by Dr. Mason, and others, that the project has merit and should continue development. There was a consensus that the topic did address a gap in current web-based learning environments.

Plagiarism is a concern for assignment assessment. This system forces the student to re-write the essay at least one time. Plagiarism would be more apparent in the second draft if a dramatically different writing style were used.

6.4.3 Summary Observations

General -

As with the pre-pilot study an orientation session was needed due to the novice IT experience of the participants. Live first-time-user sessions could be replaced if participants had a set of prerequisites to use the system. An on-line animated *show-and-do* help file is recommended (chapter 7) for the next version of the software. Adding a link to a flat list of participant e-mails which uses the FIND search engine of the browser is suggested for the next case study.

The school of Social Science has accepted a proposal by Dr. Mason to run a pilot distance learning Philosophy course via e-mail. The acceptance of this project proposal was built upon the success of this pilot study. Dr. Mason has requested further development and refinement of this research. This

type of support suggests that the research should continue further to a full case study project.

Technical -

The initial goals for the software were met in this case study. Any difficulties encountered were in areas such as problems with the university network, slow logins, etc. Javascript is recommended (chapter 4) as an addition for the next case study.

Educational -

The validation for functional use of the web-based principles and protocols developed by this research was achieved in the case study. Students were able to successfully use the on-line tools, protocols and methodologies proposed in this research to communicate with the subject expert and LED to produce applied formative evaluation feedback. It was felt, however, that the students did not fully utilise all of the features and resources available in the DELBERT Tutorial system. This was determined by examining the printouts of the tutorial screens (section 6.53). Several active entry pages had no submissions entered.

Final Recommendation -

A full case study is needed to examine the Active Entry Page feature of the tutorial system. A larger sample group would more fully test the e-mail filtering system. The study would need to be conducted over at least two terms to test the Mentor Help feature.

6.5 Summary Discussion

This summary discussion contributes two key elements to research in the area of educational technology in the web-based environment:

1. The SOFA Principle
2. The DELBERT interim-Theory (hypothesis)

1) The SOFA Principle -

The SOFA (Student-centred On-line Formative Activity) principle ties together the key elements needed to create a web-based, collaborative, problem-solving seminar environment. This *principle* is intended to serve as a *guideline* for the LED (learning environment designer) in creating such a learning *system* or shell. The following *protocols* are developed as part of the *heuristics* of this research:

Student-centred:

This approach shifts the focus of the design to the needs of the student, not the teacher. It is therefore important that communication pathways are two-way between the participants / stake holders.

On-line:

This principle is developed for a distance learning environment. Since on-line technology is constantly changing it is important not to limit the design process to any one programming language, operating system, software application or hardware peripheral (chapter 4). The world wide web was chosen since it best fits this description at the time of this writing, but is in no way limited to this technology.

Formative:

Applied formative evaluation methodology (chapter 3) is a focal issue of this report. This iterative communication process is a main component to the DELBERT interim-Theory discussed next. The LED must plan, in advance, for this effective use of this protocol.

Activity:

This element bonds the research to Web-Constructivism (chapter 2). It is the virtual act of doing through collaboration and argumentation which

must be built into the design process. Clever instructional design forces the user to roll and tumble an idea in their mind, an effective method of mental interaction not requiring an oral or motor response (Kilby 1998).

2) The DELBERT interim-Theory:

The Digital Environment Learning-Based Evaluation Response Theory states:

Upon the implementation of the SOFA Principle a web-based, problem-solving seminar environment will support collaboration and argumentation through the use of applied formative evaluation methodologies.

Figure 6.6 illustrates a fundamental *epistemology* applied by this research. This is an *a posteriori* (inductive) approach to implementing the DELBERT interim-Theory.

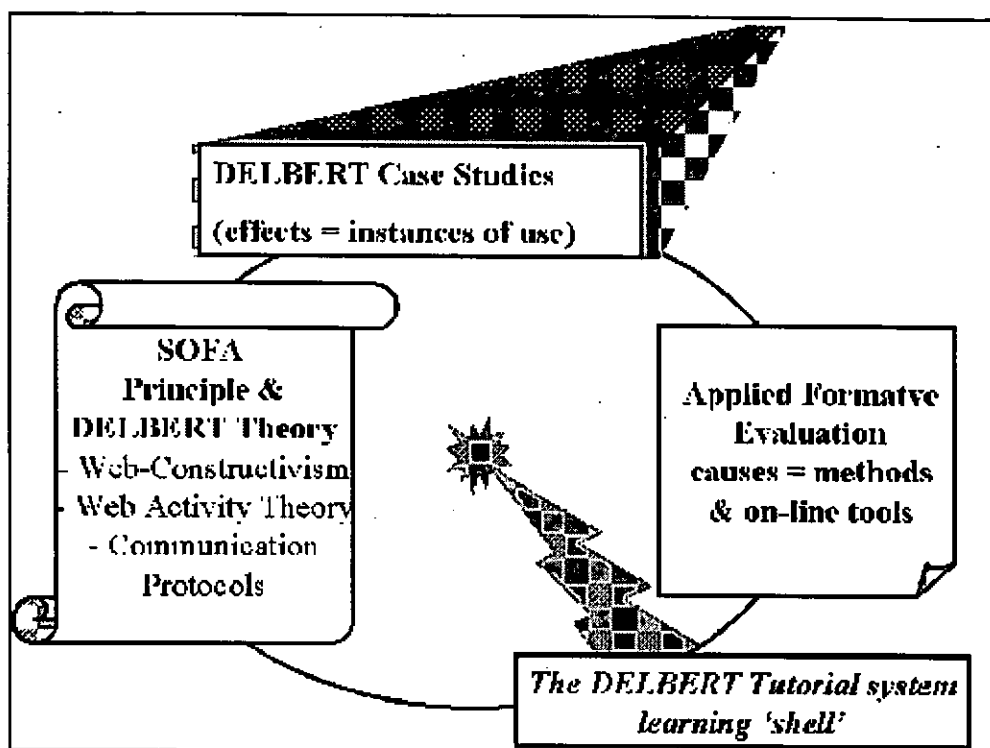


Figure 6.50
The DELBERT interim-Theory

This interim-theory was *built* by developing and adapting *real-world* theories, principles and protocols to a web-based setting. The design process began with a simple set of instructions that established a rule. The best of these rules were then adapted to form guidelines. These guidelines of the process occurring within the tutorial system evolved into principles. A system of rules to help connect tutorial participants was needed for the exchange of information. This information exchange helped towards the participants construction of knowledge and new experience through collaboration and argumentation. The DELBERT interim-theory was the result of the application of this design process (figure 6.50). The following table summarises the purpose, research methodology and results of the pilot study:

Case Study Summary Table	
Purpose of study:	<ol style="list-style-type: none"> 1. Illustrate principles and protocols of this research. 2. Test use of applied formative evaluation methods 3. Test system for functionality
Methodology:	<ol style="list-style-type: none"> 1. Inductive research methods 2. Analysis of data gained through applied formative evaluation methods and on-line tools
Result:	<ol style="list-style-type: none"> 1. System was robust and reliable 2. Principles and protocols were supported by data 3. Applied formative evaluation methods were supported in a limited fashion. A full study using a larger sample group over a longer time is needed.

Table 6.50 Philosophy Pilot Study

Summary

Critical analysis of research methods:

This study uses an inductive research methodology. That is to say, an a posteriori approach is used in examining an instance or example (the DELBERT Tutorial system software used in the pilot case studies) to support the principles and protocols produced to create the application. In this way the example of the system is presented to the students and an analysis of their interaction is made.

The narrative of this report, however, does not take this de-constructive approach. Instead, it builds to the case study by, first, introducing the learning theory, next, defining the protocol and, lastly, illustrating its use through applied formative evaluation methodologies with adapted telecommunication tools.

Table 6.51 Critical analysis of research methods

STAGES OF THE RESEARCH METHODS	RESEARCH STRENGTHS	RESEARCH WEAKNESSES
[1] Purpose of pilot studies: Test the functionality of applied formative evaluation methods for a web-based learning environment	<i>The testing of functionality yields data for; a) computing science – reliability of on-line tools b) education – effectiveness of principles and protocols</i>	<i>Functionality is a vague term that will not easily provide quantitative statistics to support the results of the research.</i>
[2] Get subject experts to commit a start problem and test subjects for the pilot case study	<i>Because the DELBERT Tutorial system is content independent, any school in the university could be approached to participate in the study.</i>	<i>Both pilots had small representative samples since involvement in the study was optional.</i>
[3] Conduct a trial use of the system: a) Education: a one-of... b) Philosophy: part of 1 term	<i>By demonstrating the system successfully in several subject matters the research method proves to be sound.</i>	<i>Not enough time was allotted for the investigation and not all of the system's features were used and/or evaluated.</i>
[4] Analyse, organise and present feedback collected through the use of video recording and on-line tools.	<i>Data was collected using a mix of observation, interview and survey techniques with both live and on-line feedback gathered during the lesson and reflectively or after the completion of the lesson. Data was cross-referenced for verification.</i>	<i>Qualitative evaluation methods do not easily produce hard statistics to generate supportive evidence. Subjective interpretations may vary.</i>

Table 6.51
Critical analysis of research methods...

STAGES OF THE RESEARCH METHODS	RESEARCH STRENGTHS	RESEARCH WEAKNESSES
[5] Make conclusions and based on the evidence gathered decide if the study goals were achieved. Then, make predictions on future work.	<i>The feedback gathered produced positive results. The conclusion is that the research warrants a full case study be conducted for a longer period of time.</i>	<i>The sample group was too small to produce any conclusive results. Only students were tested using the system. Feedback from learning environment designers (LEDs) should be gathered to gain expert evaluation statistics.</i>

CHAPTER 7: SUMMARY DISCUSSION

Objectives of this chapter –

This chapter is broken into three sections; Constructivist Reflections, Critical Analysis of Evidence Produced in Case Studies and The Error Elimination Approach. Each part is a summary discussion of various threads of this thesis. The first focuses on the learning theory aspects of educational technology. The second examines the data produced in the case studies, while the last section elaborates upon the methodology used to gather that data. The reader at the end of this chapter should be able to:

- Site the use of Constructivist learning theory in this thesis.
- Follow the critical analysis of the data.
- Understand the Error Elimination Approach.

7.0 Constructivist Reflections

The subject of this research is educational technology. It is a cross disciplinary approach addressing the problems faced by the (LED) learning environment designer in creating a web-based problem-solving setting. As such, there are two research directions, the Humanities (education) and the Sciences (computing), combined to produce a whole learning space.

Education -

The educational theory adapted to the web for this research is Constructivism (chapter 2) (Bruner 1963, et al). The product, Web-Constructivism, produces a set of principles by which the LED may use to guide the design process. These principles were demonstrated and verified by the results of the DELBERT Tutorial case study (chapter 6). The methodology for creating a web-based problem-solving seminar was guided by a set of protocols developed from the classroom setting (chapter 3). These include discussion, collaboration and argumentation as guided by Vygotsky's Activity Theory (Figure 3.40) (Vygotsky 1962). This learning space was analysed and broken into its component threads. Once understood, this environment could then be recreated which is a requirement of a good research methodology (Pugh 1994, Cohen and Manion 1994). The result produced by this study is the SOFA (Student-centred On-line Formative Activity) principle and the DELBERT Theory (chapter 6).

Technology -

Since the environment in which the process of learning takes place is virtual, this report discussed the technologies involved (chapter 4). On-line tools are unobtrusively embedded throughout the web-based tutorial system. It is recognised by this study that a fundamental nature of technology is its rapid change. What is *cutting edge* or *state-of-the-art* today can be obsolete next year. For this reason one key point of this report states:

"Technology should not drive pedagogy."

(Thorp 1998)

The world wide web is a volatile space. The rapid rate of growth over the years since its conception by Tim Berners-Lee has surpassed even the optimists expectations (Brunner 1997). None the less, it too is a form of technology that may not be here tomorrow. For this reason the focus of this research is on the principles and protocols used in the design process, how to manipulate the technology available at the time to create a Web-Constructivist learning environment. This study uses e-mail, e-mail surveys, HTML forms, Javascript and video conferencing as the tools to support a formative evaluation methodology (chapter 3). It is this methodology which guides the communication process between the LED / subject expert and other participants / stake holders.

The many technologies explored, adapted and developed in this research are merging. This convergence of technology is seen with multimedia, networks, the internet and video conferencing working in tandem through a web-based learning *shell* illustrated by the software application DELBERT [9.0]. This web-based tutorial system was not only designed by the principles discussed in this report, but also demonstrates their use through the DELBERT case study (chapter 6). The results and analysis of these pilot studies (section 7.1) support the use of the principles and protocols adapted to the web for this research project. As a pilot study the small size of the sample group of participants (Phil 1500 students at Middlesex University, Term 2 - 1997/98) produced positive results. It is recommended that a larger, more comprehensive study take place with the members of the Middlesex University Global-Campus School of Computing Science project.

Summary

Cook (1998) visualises the issues of (web-based) learning environments with the metaphor of a fish-discovering-water. A contextual theory is needed to define the learning environment. This research proposes that Web-Constructivism and the SOFA principle meet this requirement through the

DELBERT interim-Theory (chapter 6). By taking this approach the LED can:

- explain the (web-based learning) system
- recreate the system
- affect modifications to the system
- produce the next generation

7.1 Critical analysis of evidence produced in case studies

The following section is patterned after Table 1.00 that compares the Constructivist learning principle to the collaborative problem-solving protocol used in the virtual seminar and illustrated by the DELBERT tutorial system features. Table 7.10 draws the link from the principle to the protocol to the software feature and the case study evidence produced by the tutorial system. Summary comments are included after each table subsection below to clarify the examples discussed. (Tables 7.11-8)

Principle	Protocol	Feature	Evidence	Comments
1) PROBLEM-SOLVING APPROACH	<i>Start problem</i>	Assignment	<ul style="list-style-type: none"> • IT • Philosophy • CLD 	Samples given of problems used in each study.
2) PRIOR KNOWLEDGE	<i>Record past experience</i>	Annotation	<ul style="list-style-type: none"> • Philosophy 	Sample mock annotation.
3) EPISTEMOLOGY	<i>Research strategy</i>	In/external web links	<ul style="list-style-type: none"> • IT • Philosophy 	Web links used to guide student.
4) ACTIVE LEARNING	<i>Initial solution</i>	Form to post solution	<ul style="list-style-type: none"> • Philosophy • CLD 	Samples of initial solutions posted.
5) REFLECTION	<i>Compare solution to others</i>	Active entry pages & mentor help	<ul style="list-style-type: none"> • Philosophy 	Samples of responses to solutions.

Table 7.10 Summary evidence: case studies...				
Principle	Protocol	Feature	Evidence	Comments
6) COLLABORATION	<i>Revise or reaffirm</i>	Web postings and e-mails	<ul style="list-style-type: none"> • <i>Philosophy</i> 	Samples of interaction.
7) TEACHER'S ROLE	<i>Provide feedback</i>	Formative feedback	<ul style="list-style-type: none"> • <i>IT</i> • <i>Philosophy</i> 	Samples from web survey & video conference.
8) ASSESSMENT	<i>Peer review</i>	Comments on 1 st -2 nd submission	<ul style="list-style-type: none"> • <i>Philosophy</i> 	Philosophy summary e-mail.

Each section of the table is discussed in detail including a summation of the analysis below. This is broken into the eight stages presented in Table 7.10.

Table 7.11 Summary of the problem solving approach evidence				
Principle	Protocol	Feature	Evidence	Comments
1) PROBLEM-SOLVING APPROACH	<i>Start problem</i>	Assignment	<ul style="list-style-type: none"> • <i>IT</i> • <i>Philosophy</i> • <i>CLD</i> 	Samples given of problems used in each study.

The DELBERT learning system presents the student with an assignment (goal or task) to complete before introducing related content. It is through this contextualisation that Constructivism is employed via the on-line multimedia presentation formats.

The start problem evidence from the CLD study can be found in Figure 6.331 with the question and illustration of the physics dilemma. In the IT case study the national curriculum start problem is seen in Table 6.30. While the Philosophy topic question on Sartre is found in Figure 6.41.

Web-Constructivism is supported by these open-ended, real-world problems as presented in a web-based environment. These authentic tasks meet the criteria set by Jonasson (1992) in Appendix A.

Table 7.12 Summary of the prior knowledge evidence				
Principle	Protocol	Feature	Evidence	Comments
2) PRIOR KNOWLEDGE	<i>Record past experiences</i>	Annotation	<ul style="list-style-type: none"> IT Philosophy 	Sample of a mock annotation.

Once the start problem is presented the student takes a moment to reflect on a draft solution based on prior knowledge and experience. The ability to record annotation was requested by students in the IT case study (see Appendix D):

"Are there facilities to take notes? and "Can you take the problem with you?"

The transcript of the video taped session with the student teachers revealed a desire to have an on-line note pad was seen as useful. Two solutions were offered:

1. Using a split screen approach DELBERT could be open on half the screen to read the content, while a word processing programme could be used along side to make notes.
2. As figure 4.32 shows, Javascript pop-up windows can be adapted into HTML editors allowing annotation.

Appendix E - section seven offers a sample annotation page template offered to the Philosophy students in their case study. When asked why they did not use this feature two points were sited in the post study focus group; there were time constraints to complete essays and no marks were awarded for use of the annotation tool.

Table 7.13 Summary of the epistemological evidence				
Principle	Protocol	Feature	Evidence	Comments
3) EPISTEMOLOGY	<i>Research strategy</i>	In/external web links	<ul style="list-style-type: none"> IT Philosophy 	Web links to guide student.

After reflection on prior knowledge and experience research is needed to expand the student's understanding of the problem task and compose a solution. Since web-constructivism is supported by on-line resources.

Dr. Mason provided a large sample of web links (as seen in Appendix E - section 8) to guide the students in producing a solution to the assignment essay. The IT case study provided the student teacher trainers with a sample of educational web links to guide them with their problem (Appendix D - section 2).

External (outside the learning system) resources were also provided (Appendix D - section 2) to support the web-constructivists principles of personal knowledge construction. However, the novice level of the IT case study participants was reflected by these comments from Appendix A - section 1:

"Should you use internal links of search the internet?"

"What is the best way to use the search engine?"

"Do all websites come up from search engines?"

"What other ways are there to get information on the web besides search engines?"

In summary, due to time constraints and the case study subjects' lack of experience with conducting research on the web, it is recommended that a further follow-up study be conducted with more skilled internet researchers.

Table 7.14 Summary of the active learning evidence				
Principle	Protocol	Feature	Evidence	Comments
4) ACTIVE LEARNING	* Initial solution * Active Entry Pages	Form to post solution, glossary term or weblink to the HTML page	<ul style="list-style-type: none"> Philosophy CLD IT Ed. Tech. Classes 	<ul style="list-style-type: none"> * Samples of initial solutions posted. * Input dialogue from Active Entry pages

The DELBERT learning system student is given two methods of claiming the

Web-constructivist role of an active learner. The first is to claim ownership of the learning system content by actively submitting glossary terms or web links. A sample of the Educational Technology class case study (Appendix G) supports this supposition.

Date:

26/02/98

Time:

10:35:15

Remote User:

COM3120Comments

Dick Bartram[rb072@mdx.ac.uk]

<http://curry.edschool.Virginia.edu/go/frog/menu.html>

Frog Dissection online!

Date:

26/02/98

Time:

22:56:55

Remote User:

COM3120Comments

Suleyman Ali (suley@loremac.demon.co.uk)

I found a web site (article)that was particular interesting in terms of "how educational multimedia can overcome potential (¤t) problems in education". This web article is an ideal read for our projects.

<http://www.bookbuilders.org/9603/educamul.htm>

The second opportunity given to the virtual student to take an active role is with the submission of a first draft solution to the sample problem. This is illustrated by scripts taken from each study:

1. CLD work shop (Appendix F):

Date:

19/02/99

Time:

20:53:17

Comments

[Roy, Bill, Gabe] The water level stays the same if the specific gravity of the cube is less than 1, otherwise the water level goes down (assuming no water splashes out of the pool when the cube is thrown in and the man and cube together do not weigh enough to have sunk the boat in the first place).

2. Philosophy case study (Appendix E - section 2) contains sample essays from the Sartre assignment.

3. IT case study (Appendix D)

ModelGOAL: VI
 BackGroundMODEL1: YES
 Date: 28/01/98

ModelAnswer:

startProblemGOAL: false
 StartProblemGoal: YES
 startProblemSubmit: Submit Form
 Date: 30/01/98

StartProblemOpenText:

The question implies that I know what the National Curriculum is. My question is, what is the National Curriculum? Is it the same as the background information concerning the SCAA? Other than that, the question (goal) is asked in a straight forward manner that I have no problem identifying with. Secondly, your background material is directly related to the Goal. I Like it.

Minor comments concerning the background material: Use same font types for all (SCAA is in italics); It would be nice if you could provide an online reference or URL to each of the three references so I don't need to hunt for them myself; the page design for browsers with graphics turned off is too constrained with much white space all around every text area or box. Please use accessibility standards when designing web pages, see

[<http://server.berkeley.edu/~cdaveb/anybrowser.html>]

For instance this box is only 2 lines long on my browser and centred in the middle one-third of my screen. Sure is hard to see what I have written.

This text clearly illustrates the use of the system methodology to support the Web-constructivist principle of active learning.

Table 7.15 Summary of the reflective evidence				
Principle	Protocol	Feature	Evidence	Comments
5) REFLECTION	Compare solution to others	Active entry pages & mentor help	• Philosophy	Samples of responses to solutions.

Since reflection is defined as conceptual re-/evaluation in Table 2.21 Appendix E - section 6 provides examples of the exchanges that occurred in the Philosophy case study. As stated in the summary of the video conference

post-course interview many of the students felt embarrassed to publicly compare solutions. Much discussion occurred in person or via private e-mail exchanges.

The study was conducted over just one term preventing the mentor help feature of adding the e-mail contact link to the tutorial (see Table 1.2, Table 5.3, [3.6]). It is suggested that this feature be fully investigated in the next study.

Web-constructivism is supported by reflection throughout the learning process. This may be done individually by the student or with others. Individual reflection could be recorded using the on-line annotation Javascript discussed on-line (section 4.3). This is suggested for further studies of this research.

Conceptual reflection may be done privately (via e-mail or live discussion) or publicly through posting revised essays on the web (Appendix E - section 4) as illustrated in the Philosophy case study.

Table 7.16 Summary of the collaborative evidence				
Principle	Protocol	Feature	Evidence	Comments
6) COLLABORATION	<i>Revise or reaffirm</i>	Web postings and e-mails	<ul style="list-style-type: none"> • EdTech classes • Philosophy • CLD™ 	Samples of interaction

The summary statements below support the Web-constructivist principle of collaboration. This may occur on-line or in person with a group around the PC as seen in the CLD work shop example (section 6.23)

Andrew Roberts:

The workshop session attempted to overcome the prejudice that electronic education is an activity for isolated individuals who are not collaborating. We formed groups around a computer to work on a group project that Anthony Basiel had devised concerning the displacement of water by an object. I would have liked to have been told the answer (!). However, the point was for us to see the ways in which collaboration can take place in web based learning. The small group discussion I was in generated ideas that I continued to discuss in relation to the "Human Computer Interface" with Judith Harding (CLD) by email after the workshop, and which have since formalised in my mind on the model that Charles Crook uses. Crook distinguishes between collaboration with computers (replicating principles of collaboration in computer programmes), collaboration at computers (groups working together at a computer task), collaboration in relation to computers (for example, talking in class about issues flowing from a computer activity) and collaboration through computers (reading and writing emails and writing on the web). (Appendix F - section 2)

A further validation of this research is the off shoot of related projects built from the principles and protocols developed in this thesis. Two examples are:

1. Professor Torrance's LASER project (s.torrance@mdx.ac.uk):
2. Robert Andrew's SHE project (Appendix F - section 2):

Because Anthony Basiel's work was on the web, I was able to study it. I adapted the principles of his high technology approach to the low technology aptitudes of most of my students and myself. This had advantages and disadvantages. Because it was popular with students who had not used computers before, the project generated a larger volume of email than I could manage. At this point Anthony Basiel was able to support me by pointing out the use of filtering (a feature he stressed at the workshop). (Appendix F - section 2)

Table 7.17 Summary of the teacher's role evidence				
Principle	Protocol	Feature	Evidence	Comments
7) TEACHER'S ROLE	<i>Provide feedback</i>	Formative feedback	<ul style="list-style-type: none"> • IT • Philosophy 	Samples from web survey & video conference.

Since a primary focus of this thesis is formative evaluation, substantial evidence has been produced in the various case studies (Appendix D & E) to demonstrate the use of the on-line tools to facilitate communication between the participants during the use of the DELBERT Tutorial system. This has taken the form of text files submitted to the server from the HTML forms, e-mail sent to the tutor and LED, as well as transcripts from the desk-top video conference interview. From the technical side the system was quite robust. There was only two occasions where the server went down. As the end-of-web survey indicates as a small sample (Appendix E – part 5) student feedback was positive for usability issues.

The sample feedback below is taken from the web survey directly after the start problem of the IT case study (Appendix D - section 1):

1) StartProblemOpenText:

It would have been useful to have starting web site address this would have cut down the time spent searching the web.

2) StartProblemOpenText:

I understood what the background material was saying, but I didn't understand what that had to do with the goal--what are you trying to say about the goal with the background material?

In this study replies to the comments were given verbally. Any of the on-line communication tools described in chapter 4 could have been used. As stated in the next section of this chapter (7.2) it is, in fact, the negative comments which are desired that can lead to positive modifications made to the learning system.

Table 7.18 Summary of the assessment evidence				
Principle	Protocol	Feature	Evidence	Comments
8) ASSESSMENT	Peer review	Comments on 1st, 2nd submission	• Philosophy	Philosophy summary e-mail

Since summative assessment was not an aim of this study there was no attempt to gather evidence to compare the results of the DELBERT Philosophy students with the actual Phil1500 students. However Dr. Mason's e-mail summarises his view:

Date sent: Tue, 03 Nov 1998 07:01:25 -0800
 From: Jeffrey A Mason <jeff4@net999.com>
 Subject: Re: DELBERT summary
 To: a.basiel@mdx.ac.uk

"The DELBERT Philosophy Case Study.

Last year, 1997-1998, Anthony "Skip" Basiel and I adapted his DELBERT on-line communication system to become an essay writing tool. While DELBERT is very flexible in how it is used, we picked a single topic from the syllabus of the Philosophy Foundation Course in the second semester and invited volunteers to write a first and a second draft of an essay on the topic about of what Sartre meant by saying that for us existence precedes essence. The following students who gave permission to have their names published in this thesis participated:

John Francis JF107@mdx.ac.uk
 Raymond Sands RS194@mdx.ac.uk
 Malcolm Raymond MR168@mdx.ac.uk
 Christian Roberts CR122@mdx.ac.uk
 Krista Stevens KS139@mdx.ac.uk
 Jacob Kalinski JK130@mdx.ac.uk
 Melanie Harper MH214@mdx.ac.uk

The record of the grades that these students got shows they did rather well. The essays and student feedback can be found on the DELBERT site:

<http://skip.mdx.ac.uk/DELBERT/>

In outline, this writing system brings together research materials, ease of communications, feedback and help all on one package. The research materials are websites arranged in decreasing levels of generality. The most general are websites that any students could use, websites about writing essays, about grammar, etc. Second some general philosophy sites, encyclopedias, philosophical dictionaries, etc. Third are sites specifically devoted to existentialism and phenomenology. Fourth are sites devoted to Sartre. If DELBERT were used more widely, the first rank of websites could be used with any humanities course, the second rank for all philosophy courses, the third for courses on existentialism and phenomenology, and the fourth for classes on Sartre. The students were required to read the course book "Existentialism as a Humanism", look through secondary texts and web sites and then write a first draft of their essay. This essay was then submitted to DELBERT and kept on a scrolling file to which everyone had access. Each submission had a hot email button, so that either myself or the students could email each other. I found it easy and quick to comment on each first draft by email. If there were problems that everyone was having, then I could email the group as a whole. After reflecting on their first drafts and the feedback they received from me and other students, they rewrote their essays and submitted them to DELBERT again. In addition, they printed out their second draft and submitted it in paper form to the office. This step could be eliminated in future, and would stop the crush at the student office at essay time. Some other way could be found to give students a receipt for their work.

An added advantage to this system is that it overcomes what is becoming a problem, namely the stealing of second rate essays from the internet. It is possible to copy a "B" essay on almost any subject in philosophy, but it is a lot harder to download two essays, both on the same subject, where one is slightly better than the other, and both are written in the same style.

Besides putting all the participants in the class in email contact with each other, they also have immediate contact with the teacher of the content and the system designer. Feedback

opportunities were built into the DELBERT system, as were class evaluation forms.

In the end I see how DELBERT, properly developed, could turn into the basis of a fully functional distance learning system, to rival others that are in the market now, such as TopClass by WBT Systems. You can post your lectures and notes into it. It handles the on-line discussions, E-mail, tests, score recording, class lists, and so on. The software manufacturer is at <http://wbtsystems.com>.

DELBERT could be made to do these things and more with the right support.

Yours,

Dr. Jeff Mason

7.10 Summary

In the preface of this report it was recognised that there were limitations to the investigation due to time constraints and the small numbers involved in the case study. It is felt, however, that sufficient evidence in each of the areas highlighted in Table 6.430 has been produced to support the principles and protocols developed in this research. Further research in this area is encouraged in the Global Campus project of the School of Computing Science, Middlesex University - London, England.

7.2 The Error Elimination Approach

The Error Elimination Approach to Evaluation:

The philosopher Karl Popper (1972) originally used the concept of "error elimination" to explain how progress is made in developing scientific theories. The same concept can be applied to the logical development and improvement of instructional systems (Ellington 1995).

The Error Elimination approach to evaluation can be applied to the development of instructional systems based on two assumptions: first, that the instructional system is not an independent entity and the system can be

effected by the use of this methodology.

The instructional system is not an independent entity:

This assumption ties in with the Constructivist approach to knowledge, that knowledge does not exist independently of the student. Knowledge resides within the mind of the learner (chapter 2). The table below depicts the instructional system as being part of a total system - fulfilling a specific function by helping the student get from Situation A to Situation B, thus justifying its existence *a priori*.

<i>Situation A</i>	$\Rightarrow \Rightarrow \Rightarrow \Rightarrow \Rightarrow$	<i>Situation B</i>
Students thought capable of achieving certain objectives, but lacking some or all of the necessary knowledge, In skills or attitudes.	Instructional system designed to supply all or part of the necessary education and/or training	Qualified people who have achieved the specified objectives, and can proceed to the next stage of education or training (or take their place in society).

Table 7.20 Ellington 1995, p. 150

The system can be effected:

The second assumption suggests that the development and improvement of the instructional system can be achieved through a methodology suggested by Popper (1972) and illustrated by the principles and protocols developed in this research (chapter 2 & 3). Table 7.31 illustrates the Error Elimination process and its cyclical or iterative nature as suggested in Figure 7.26 of this chapter.

P1 \Rightarrow	TS \Rightarrow	EE \Rightarrow	P2
<i>initial problem situation</i>	<i>trial solution</i>	<i>error elimination</i>	<i>new problem situation</i>
identification of the need for the use of an instructional system	development and operation of the instructional system	looking for ways in which the instructional system is failing to achieve its objectives	identification of areas in which the instructional system could be improved

Table 7.21 Ellington 1995, p. 150

Stages in the Development of an Instructional System:

Stage1:

Identification of (P1): Initial Problem Situation

X = desired objective: such as knowledge, skills and/or attitudes.

Y = relevant knowledge: prior knowledge and experience with which the student enters the lesson.

X-Y = the gap to be bridged by the instructional system.

Stage 2:

Development and Operation of the Instructional System

1) Design Methodology -

To achieve the objectives represented by X-Y (in full or in part) a design methodology must pre-plan for the various threads in the learning environment such as overall structure, preparing content presentation modes of representation, etc. as illustrated in the taxonomy above.

2) Administrative Considerations -

To put the instructional system into operation technical and administrative issues must be considered. These topics are addressed in the case study presented in chapter 6.

Stage3:

The Error Elimination Process

According to Popper (1972) a theory (or in this case an instructional system) should not be tested by trying to prove it right but by trying to prove it wrong. This would be done by looking for ways in which the theory can be shown to be incompatible with experimental evidence. For an instructional system, the testing should be carried out not by trying to prove that it is succeeding in achieving its objectives, but looking for ways in which it is manifestly not succeeding. In other words, the feedback gained from the system should not always be a positive response from the student. It is the

information gained as to where the system fails that will produce the most benefit to the student's needs.

The applied formative feedback methodology discussed in this report used with the protocols in chapter 3 over the on-lines tools from chapter 4 produce student input which allow change to take place. The Error Elimination Process can occur in a web-based learning environment, as seen in the case study of chapter 6, to bring about an overall change in the system.

Stage 4:

Identification of (P2): Identification of the New Problem Situation

This stage should reveal the area in which the instructional system needs to change (or improve) and (hopefully) point out how these modifications could be carried out. Figure 4.1 demonstrates the use of e-mail filters to bring about this stage in a web-based learning environment.

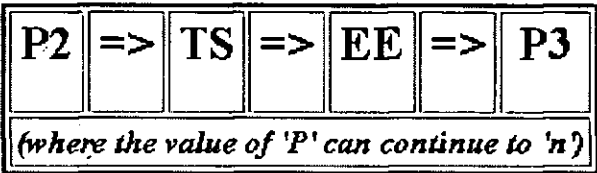


Table 7.22
Ellington 1995 p.152

This on going, open-ended methodology portraits a continuously evolving and developing instructional system as illustrated in table 7.32. This methodology is supported in a web-based environment that reflects its very nature.

The Error Elimination Process was used in this research in two ways:

1. the problem-solving strategies are supported by the DELBERT protocols
2. this approach was adopted in the analysis of the case study data

7.3 Summary Discussion

Reflection is a continuous thread throughout this study. It is seen in the Web-Constructivist principles of chapter 2, supported by the protocols and applied formative evaluation methods of chapter 3 and illustrated in the DELBERT Tutorial system software (chapter 5). This summary discussion asserts that, upon reflection, the initial research questions; Can Web-Constructivism and collaborative problem-solving protocols support a web-based tutorial system using applied formative evaluation methodologies and on-line communication tools?, and: Can a set of principles be established to support an interim-theory (hypothesis) to guide the learning environment designer (LED) through the design process of a web-based learning environment?, have been successfully addressed within the recognised limits of the study. This document contributes to the field of educational technology with sound principles and protocols as supported by appropriate research methods to produce “applied formative evaluation methods in a web-based environment”.

BIBLIOGRAPHY

WEB REFERENCES VISITED NO LATER THAN 12/98

Chapter 1: Literature References

Basiel A. 1997 - <http://skip.mdx.ac.uk/1Tin%20ED.htm> <visited 12/98>

Blair T. 1997 "National Grid for Learning - The Government's Consultation Paper" DfEE publication 98/30712/1097/44 ISBN 0 85522 645 5

Hein, G. 1995 "The Maze and the Web: Implications of Constructivist Theory for Visitor Studies"

<http://www.lesley.edu/faculty/ghein/mazeweb.html> <visited 20/10/98>

1998 proceedings VSA. Contact Prof. Ross Loomis, President, Visitor Studies Association, Psychology Department, Clark B219, Colorado State University, Ft. Collins, CO 80521-1876, email - loomisr@lamar.colostate.edu.

Laurillard, D. 1996 - "The Educational Challenges for Teachers and Learners" Keynote presentation, The Virtual University Conference - London, England 25/5/96

NATIONAL GRID REFERENCE 1998:

<http://www.dfee.gov.uk/dfeehome.htm> <visited 12/98>

Open University mission statement 1998 -

<http://www.open.ac.uk/OU/News.html> <visited 12/98>

Thorpe, M 1988 - "Evaluating Open and Distance Learning" - Longman, Harlow

TLTP 1998 - <http://www.icbl.hw.ac.uk/tltp/> <visited 12/98>

Chapter 1 - Web References:

Funderstanding 1998: <http://www.funderstanding.com/>

GWU 1998: <http://www.gwu.edu/~tip/theories.html>

Chapter 2: Literature References -

Bensusan, G. 1995- "Whose Sky Is It Anyway?", NAU Press.- AZ., USA

Bruner, J. 1966 - "Toward a Theory of Instruction", Cambridge Ma. Harvard University Press 1966

Cochrane, P. 1995 - "The Virtual University" Business of Education Journal

Cochrane, P. 1996 - "The Virtual University" Keynote presentation at the Virtual University Conference 24 May 1996 U of L

Dewey, J. 1993 - "How we think: Revised and Expanded Edition", Houghton Mifflin

Driscoll, M 1994 - "Psychology of Learning Instruction" Learning and Instructional Technology - British Library: YK194b 4906

Elton, G.R. 1982 - "The Practice of History" Sydney University Press

Grabe, M. & Grabe, C. 1997- "Integrating Technology for Meaningful Learning" 2e- Houghton Mifflin [6]

Lanham, R. 1993 - "The Electronic Word" - Chicago Press

Mahoney, M.J. 1994 - Human Change Processors, London - Basic Books

Theng, Y. L. 1997 - "Lost in Hyperspace" Ph.D. Thesis - Middlesex University

Chapter 2: Web References -

[2.1] http://www.funderstanding.com/learning_theory_how2.html
<visited 10/98>

[2.2] <http://www.gwu.edu/~tip/theories.html> <visited 10/98>

[2.3] <http://www.cudenver.edu/~bwilson/metaphor.html> <visited 10/98>

[2.4] <http://metric.ma.ac.uk/~pkent/construction/construction.html>
<visited 10/98>

[2.5] <http://www.gem.org.uk/hein.html> <visited 10/98>

[2.6] <http://www.hmco.com/college/education/station/concept/construct/conback.htm> <visited 10/98>

[2.7] <http://skip.mdx.ac.uk/webresources/webconstructivism.htm>
<visited 10/98>

[2.8] <http://www.labs.bt.com/people/cochrap/> <visited 10/98>

[2.9] <http://www.lmu.ac.uk/> <visited 10/98>

[2.10] <http://cs.www.bu.edu/techreports/> <visited 10/98>

[2.11] Criteria for Evaluation of Internet Information Resources:

<http://www.vuw.ac.nz/dlis/cources/847/m2resevl.html> <visited 10/98>

[2.12] Museum-Ed Newsgroup: To: museum-ed@freedom.mtn.org
<visited 10/98>

[2.13] <http://www.gvv.edu/~tip/bruner.html> <visited 10/98>

[2.14] <http://tecfa.unige.ch/edu-comp/edu94/contrib/schneider/learn.fm.html>
<visited 10/98>

[2.15] <http://www.austinlinks.com/Fuzzy/> <visited 10/98>

[2.16] <http://www.uib.no/People/sinia/CSCL/web-bstruktur-836.htm>
<visited 10/98>

[2.17] <http://www.austinlinks.com/Fuzzy/tutorial.htm> <visited 10/98>

[2.18] <http://www.lesley.edu/faculty/ghein/mazeweb.html> <visited 10/98>

Chapter 3: Section 1 - Protocols

Literature References-

Aakhaus, P. (1996) "Designed Discourse and Discourse Design"

International Conference, Chicago - USA

Basiel, A. 1995 "The INT1000 Interactive Multimedia Tutorial" MSc. Thesis,
Middlesex University, London -UK

Checkland 1979 -([3.4] Davies, D. 1997) "Learning Network Design: A
Methodology for the Construction of Co-operative Distance Learning
Environments" CECOMM Research Centre, Southampton Institute - UK

Cohen, L. and Manion, L. 1994 - "Research Methods in Education"

Routledge Press 1994

Davies, P. 1960 "Press #21" - Institute of Educational Technology - Open
University Press

Davies, D. 1997 - "Learning Network Design: A Methodology for the
Construction of Co-operative Distance Learning Environments"- CECOMM
Research Centre Report

Hewitt, J. 1998 "Situative Design Issues for Interactive Learning
Environments: The Problem of Group Coherence" Open University Press

Jackson, S. 1997 - "Protocols for On-line Learning: A Problem of Discourse
Design" NAU/web Conference, AZ. - USA

Mason, R. 1988 - "Computer Mediated Conferencing in Distance Education at the O.U." Centre for IT in Ed. #56

Mason, R. 1996 - "Methods for Evaluating Applications of CMC" OU Press
- PLUM Paper #31

Oxford Dictionary 1997 , Oxford University Press - England

Papert, S. 1980 - "Mindstorms", Harper Collins - NY, USA

Skinner, B. F. 1968 - "The Technology of Teaching" Appleton-Century-Crofts, NY-USA

Vygotsky, L. V. 1962 - "Thought and Language", Cambridge - Ma.-USA, MIT Press

Chapter 3: Section 1 - Protocols

Web References -

[3.0] http://www.cudenver.edu/~mryder/itc/act_dff.html <visited 1/10/98>

[3.1] <http://www.cudenver.edu/~mryder/itc/activity.html#vygotsky>
<visited 1/10/98>

[3.2] http://csile.oise.on.ca/abstracts/situ_design/ <visited 1/10/98>

[3.3] <http://skip.mdx.ac.uk/DELBERT/> <visited 1/10/98>

[3.4] Davies, D. 1997 "Learning Network Design: A Methodology for the Construction of Co-operative Distance Learning Environments" CECOMM Research Centre, Southampton Institute - UK

[3.5] Kilby, T. (1998) The Web-based Training Information Center URL:
<http://www.filename.com/wbt/~private/rules.htm> <visited 1/10/98>

[3.6] Norman, K.L. "Teaching in the Switched On Classroom: An
Introduction to Electronic Education and Hypercourseware, HCI Laboratory
University of Maryland - USA 1997 <http://www.hypercourseware.com/soc/>
<visited 1/10/98>

[3.7] Globalwide Network Academy (GNA) <http://catalog.gnacademy.org/>
<visited 1/10/98>

[3.8] http://www.funderstanding.com/learning_theory_how.html
<visited 1/10/98>

Chapter 3: Section 2 - Applied Formative Evaluation

Literature References -

Bensusan 1996 - "Whose Sky Is It Anyway?" NAU Press, USA

Biggs, J. B. 1982 - "The Quality of Learning - The SOLO Taxonomy"
Academic Press ISBN # 82 054889

Cohen, L. and Manion, L. 1994 "Research Methods in Education"
Routledge Publishers

Collis, 1991 Collis,B. 1991, "Evaluating Instructional Applications of
Telecommunication in Distance Learning", E.T.T.I. , Vol.30 #3 August

Dix, A. 1993 "Human Computer Interaction" -Prentice Hall

Draper, S. 1995 " Integrative Evaluation An Emerging Role for Classroom
Studies of CAL" <http://www.psy.gla.ac.uk/~steve/ie.html> <visited
6/10/97>

Ellington, H. 1995 "Handbook of Educational Technology" Kogan Page Ltd., London

Elton, G.R. 1982 "The Practice of History" - Sydney University Press

Laurillard, 1994 Laurillard, D. 1994 - Rethinking University Education - Prentice Hall, 1994 -Journal references:

Mason, 1996 Mason, R. 1996 - Methods for Evaluating Applications of Computer Mediated Conferencing, Open University Press, Plum Papers #31,

Nardi, B. 1997 "Concentrating on Context: The Relationship Between the Technical and the Contextual" HCI'97 Conference Companion, Springer Publishers 1997

Papert, S. 1980 " Mindstorms" Harper-Collins

Papert, S. 1993 "The Childrens' Machine" Harper-Collins

Popper, K.1972 "The Logic of Scientific Discovery" Hutchinson, London

Rowntree, D.1992 "Exploring Open and Distance Learning" Kogan Page Ltd., London

Stufflebeam and Webster, 1980 Jonassen (1994), Designing Hypermedia for Learning, Education and Training Technology Journal, British Library S11501604X

Thorp, M 1988 " Evaluating Open and Distance Learning" - Longman, Harlow

Chapter 3: Section 2 - Applied Formative Evaluation
Web References -

[6.1] URL hit counters and other free distributed web resources:

<http://206.161.225.56/~maxlee/FWPReview/> <visited 10/10/98>

[6.2] Macromedia Attain Enterprise Learning System:

<http://www.macromedia.com/learning/solutions/system/> <visited 10/10/98>

[6.3] The Concise Oxford Dictionary 1997 - Oxford University Press

[6.4] IEE Video Conference Lecture: "British Petroleum - Video Conferencing Techniques" 1997

[6.6] The DELBERT Tutorial system: <http://skip.mdx.ac.uk/DELBERT/> <visited 10/10/98>

Chapter 4: Adapted On-line Tools

Literature References -

Boyle, T. 1997 - "Design for Multimedia Learning", Prentice Hall - London, England -1997

Bensusan, G. 1995 - "Whose Sky is it Anyway", North Arizona University Press, AZ. - U.S.A.

Brunner, J. 1997 - "Internet for Beginners", Icon Books - Cambridge, UK

Hein, G. 1995 - "Evaluating teaching and learning in museums", Routledge Press - London, England

Kraut, R. 1997 - "Residential Use of the Internet: Results for the HomeNet Field Trial" Carnegie Mellon University HCI'97 Conference Companion, HCI'97 Conference - Bristol, England

Laurillard, D. 1994 - "Rethinking University Education", Prentice Hall-London, England - 1994

Laurillard, D. 1996 - "The Educational Challenges for Teachers and Learners", Virtual University Conference 24 May 1996, University of London, UK

Mason, R. 1992 - "Methods for Evaluating Applications of Computer Conferencing" , OU Press - PLUM Paper #31

Wilson, T. 1996 - "Capability in Higher Education", The Virtual University Conference - U of L, London -England

Chapter 4: Adapted On-Line Tools

Web References -

Jackson, S. 1996 <http://star.ucc.nau.edu/~nauweb97/papers/jackson1.html> <visited: 21/08/98>

Bruner, J. 1966 <http://www.gwu.edu/~tip/theories.html> <visited: 21/08/98>

[5.1a] <http://skip.mdx.ac.uk/webresources/password.html> <visited: 21/08/98>

[5.2a] <http://skip.mdx.ac.uk/webresources/namescript.htm> <visited: 21/08/98>

[5.3a] <http://skip.mdx.ac.uk/webresources/makebox1.htm> <visited: 21/08/98>

[5.4a] <http://skip.mdx.ac.uk/webresources/alert.htm> <visited: 21/08/98>

[5.5a] <http://skip.mdx.ac.uk/webresources/clickresponse.htm>
<visited: 21/08/98>

[5.6a] <http://skip.mdx.ac.uk/webresources/randontext.htm>
<visited: 21/08/98>

[5.8a] <http://skip.mdx.ac.uk/webresources/alert3.html> <visited: 21/08/98>

[5.9a] <http://www.jchelp.com/test2000/test2000.htm> <visited: 21/08/98>

[5.10a] <http://skip.mdx.ac.uk/webresources/> (under Contents: 2)
<visited: 21/08/98>

[5.11a] <http://skip.mdx.ac.uk/webresources/distribute.htm>
<visited: 21/08/98>

[5.12a] http://www.htmlgoodies.com/g_book.html#basic <visited:
21/08/98>

[5.13a] <http://skip.mdx.ac.uk/webresources/websurvey.htm>
<visited:21/08/98>

[5.14a] http://skip.mdx.ac.uk/webresources/graph_time.htm
<visited:21/08/98>

[5.15a] <http://skip.mdx.ac.uk/CLD/ELFppt/index.htm> <visited: 21/08/98>

[5.16a] <http://skip.mdx.ac.uk/webresources/360pan.htm> <visited:
21/08/98>

[5.0] Microsoft Hotmail: <http://hotmail.com/> <visited 10-10-98>

[5.1] Delphi Virtual Community website: <http://www.delphi.com/>
<visited 10-10-98>

[5.2] Mailto:Formatter, Aracnid Worldwide Corporation - Robert P. Fries -
R.Fries@aracnid.com <visited 10-10-98>

[5.3] Decisive Survey: <http://www.decisive.com/> <visited 10-10-98>

[5.4] Caucus collaboration software: <http://www.screenporch.com/>
<visited 10-10-98>

[5.5] NAU: <http://www.nau.edu/> <visited 10-10-98>

[5.6] CU-seeme Video Conference: <http://www.cuseeme.com/>
<visited 10-10-98>

[5.7] Connectix Video Conference: <http://www.connectix.com/>
<visited 10-10-98>

Chapter 5: Illustrating the principles and Protocols: The DELBERT Tutorial System

Literature References-

Dix, A. 1995 "Human Computer Interaction" Prentice Hall, UK

Lowe, D. 1998 "Creating Web Pages for Dummies" IDG Books, USA

Chapter 5: Illustrating the principles and Protocols: The DELBERT Tutorial System

Web references -

[7.20] <http://info.med.yale.edu/caim/manual/contents.htm>

[7.21] List of distributed web resources:

<http://206.161.225.56/~maxlee/FWPReview/fmp.html>

Chapter 6: Research Methodology: Case Study Analysis

Literature References -

Biggs, J. B. 1982 "The Quality of Learning - The SOLO Taxonomy"

Academic Press ISBN # 82 054889

Elton, G.R. 1982 "The Practice of History" Sydney University Press

Ellington, H. 1995 "Handbook of Educational Technology" Kogan Page

Ltd., London

Hein, G. 1995 "The Maze and the Web: Implications of Constructivist Theory for Visitor Studies"

<http://www.lesley.edu/faculty/ghein/mazeweb.html>

<visited 20/10/98> 1998 proceedings VSA. Contact Prof. Ross Loomis, President, Visitor Studies Association, Psychology Department, Clark B219, Colorado State University, Ft. Collins, CO 80521-1876, email, loomisr@lamar.colostate.edu.

Kilby, T.1998 - The Web-based Training Information Center

URL: <http://www.filename.com/wbt/~private/rules.htm> <visited 1/10/98>

Mason, 1996 Mason, R. 1996 - "Methods for Evaluating Applications of Computer Mediated Conferencing" Open University Press, Plum Papers #31, 1996

Papert, S. 1988 "MindStorms" MIT Press, USA

Strauss, A. 1990 "Basics of Qualitative Research: Grounded Theory Procedures and Techniques" Sage Publishers, London.

Stufflebeam and Webster, 1980 - Jonassen 1994 - Designing Hypermedia for Learning, Education and Training Technology Journal, British Library S11501604X

Chapter 6: Research Methodology: Case Study Analysis

Web-references -

[8.31] MRS: <http://www.mdx.ac.uk/www/researchsoc/mrshome.htm>
<visited 10/98>

[8.32] COM3120: <http://skip.mdx.ac.uk/Teaching/com3120.htm>
<visited 10/98>

[8.33] COM2100: <http://skip.mdx.ac.uk/Teaching/com2100.htm>
<visited 10/98>

[8.34] CLD/ELF presentation: <http://skip.mdx.ac.uk/CLD/>
<visited 10/98>

[8.35] Embassy Study Tours:
<http://skip.mdx.ac.uk/CLD/DELBERTdemo.htm>
<visited 10/98>

[8.36] DELBERT Philosophy Case Study:
http://skip.mdx.ac.uk/DELBERT/Philosophy/P_menu.htm <visited
10/98>

[8.37] DELBERT IT Case Study:
<http://skip.mdx.ac.uk/DELBERT/MENU.htm> <visited 10/98>

[8.41] Web Based Training Information Center: Kilby, T:
<http://www.filename.com/wbt/index.html>

[8.51] Dr. Jeff Mason: (jeff4@mdx.ac.uk) Lecturer for the Phil. 1500 course at
Middlesex University

[8.52] William Prescott (w.prescott@mdx.ac.uk), a computer technician at
the Tottenham campus

Chapter 7: Summary Discussion

Literature References -

Biggs, J. 1982 "Evaluating the Quality of Learning" -Academic Press, New York

[4.00] The Concise Oxford Dictionary - Oxford University Press 1996

[4.01] Longman Dictionary - Oxford Press 1996

Chapter 7: Summary Discussion

Web References -

[4.02] <http://www.hhmi.org/grants/lectures/vlab1/> <visited 10/10/98>

BasieI, A. 1997 - "The INT1000 Interactive Multimedia Tutorial" MSc. Thesis, Middlesex University - London

Biggs, J. 1982 - "Evaluating the Quality of Learning" -Academic Press, New York

Boyle, T. 1997 - "Design for Multimedia Learning", Prentice Hall - London, England -1997

Bruner, J. 1966 - "Toward a Theory of Instruction", Cambridge Ma. Harvard University Press 1966

Brunner, J. 1997 - "Internet for Beginners", Icon Books - Cambridge, England - 1996

Cohen, L. and Manion, L. 1994 - "Research methods in education" Routledge Publishers 1994

Cook, C. 1998 - "Should the Design of Communication Technology Reflect Culture" Keynote presentation at the Human Centred Technology Conference, COG at the University of Sussex 1998

Kilby, T.1998 - The Web-based Training Information Center
URL: <http://www.filename.com/wbt/~private/rules.htm> <visited 1/10/98>

Nielson J. 1998 – HCI usability heuristics news group: AlertBox

Pugh, D.S. 1994 - "How to get a Ph.D." Open University Press - ISBN 0335 192 149

Thorp, M. 1998 - "Keynote presentation for the Open Learning Forum" - U of Sussex, England / IET of the OU 1998

Thorp, M 1993 - "Evaluating Open and Distance Learning" British Library YK1993.a.14235

[9.2] Longman Dictionary of Contemporary English 1995 - British Library
ISBN: 058223751 3

Chapter 7: Summary Discussion

Web References -

[9.0] DELBERT: <http://skip.mdx.ac.uk/DELBERT/> <visited 14/10/98>

[9.1] AI Help Software: ShallowRed by NeuroStudio -
<http://www.neurostudio.com/> <visited 14/10/98>

[9.3] Centre for Learning Development (CLD) - <http://hello.to/ELF/>
<visited 14/10/98>

[9.4] NCET: <http://www.ncet.org.uk/> <visited 14/10/98>

[9.5] TTA: <http://www.tta.org.uk/> <visited 14/10/98>

[9.6] DELBERT Annotation Page:

<http://skip.mdx.ac.uk/webresources/makebox2.htm> <visited 19/10/98>

[9.7] Co-Mentor: UK funded project which develops a collaborative working environment <http://comentor.hud.ac.uk/>

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GLOSSARY:

active web pages: web pages which require the participant to dynamically interact with the web-based learning system such as entering a new found URL to a web resources page.

a posteriori: inductive, from effects to causes (Oxford Dictionary 1997), inductive: the inference of a general law from a particular instance, deductive: to infer a particular instance from a general law. **a posteriori:** inductive, from effects to causes (Oxford Dictionary 1997), inductive: the inference of a general law from a particular instance, deductive: to infer a particular instance from a general law. Longman Dictionary 1995 - Clays Publishers Ltd. ISBN: 0 58223751 3

a priori: 1) deductive reasoning, proceeding from causes to effects (opposite - A POSTERIORI) 2) (of concepts, knowledge etc.) logically independent of experience; not derived from experience (opposite-EMPIRICAL) 3) not submitted to critical investigation. [Oxford Dictionary - 1997]

distance learning shell: this generic term refers to commercially or academically developed web-based learning environments. [see Appendix B]

environment: all events which influence people, the area of a space or place

epistemology: philosophy of education and learning

fuzzy logic: Fuzzy Logic is a departure from classical two-valued sets and logic, that uses "soft" linguistic (e.g. large, hot, tall) system variables and a continuous range of truth values in the interval [0,1], rather than strict binary (True or False) decisions and assignments. Formally, fuzzy logic is a structured, model-free estimator that approximates a function through linguistic input/output associations. <http://www.austinlinks.com/Fuzzy/>

galvanic response: an evaluation methodology which measures the chemical/electrical reaction produced by the skin from external stimulus.

guideline: instructions on the best way to do something

live: for this document a live interaction is one with fact-to-face communication as opposed to one that is mediated through technology.

principles: rules of a process: series of actions, developments or events to produce a change or result

rules: official instructions which have a controlling influence on action, a system for control

protocols: system of rules, method of connecting (people through computers) to exchange information (which leads to new knowledge and experience).

snail mail: non-digital mail delivery, traditional postal or paper-based exchange.

system: group of related parts that work together for one purpose, organised set of ideas or methods methodology: way of doing something, strategy or principle

tutorial: In this research *tutorial* refers to a web-based learning system to facilitate collaboration and argumentation. It is not the traditional stand-alone, content driven instructional design associated with live teaching environments.

template design: a generic, reusable system design that acts as a model to be adapted for multiple use.

Longman dictionary 1995 – Clays Publishers Ltd. ISBN: 0 58223751 3

Terms are listed from general-to-specific use.

- *virtual university* – an on-line university education system that is not geographically defined. This system uses a variety of telecommunication tools.
- *mass learning* – a learning environment which contains a student to teacher ratio, on-line or classroom setting.
- *life-long learner* – mature student that may be for a new skill or career.
- *system* – group of related parts that work together for one purpose, organised set of ideas or methods.
- *methodology* - way of doing something, strategy or principle
- *principles* – rules of a process
- *process* – series of actions, developments or events to produced a change or result
- *rules* – official instructions which have a controlling influence on action, a system for control
- *guideline* – instructions on the best way of doing something
- *protocol* – system of rules, method of connecting (people through computers) to exchange information (which leads to new knowledge and experience)
- *environment* – all events which influence people, the area of a space or place
- *epistemology* – philosophy of education and learning
- *a posteriori* – inductive, from effects to causes
- *inductive* – the inference of a general law from a particular instance
- *deductive* – to infer a particular instance from a general law

APPENDIX

Appendix A - Constructivist principles

Appendix B - Web-based learning shell evaluations

Appendix C - Middlesex Research Society Template Guidelines

Appendix D - IT Case Study Transcripts

Appendix E - Philosophy Case Study Transcripts

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Appendix F - CLD Workshop Transcripts

Appendix G - Educational Technology Class Transcripts

Appendix H - List of Publications

Appendix A

Constructivist Principles

The following list of Constructivist principles are grouped in alphabetical order by author's name:

- 1) Basiel, A. 1998
- 2) Boyle, T 1997
- 3) Brooks & Brooks 1993
- 4) Bruner, J. 1973
- 5) Cunningham, D. J. 1993
- 6) Funderstanding 1998
- 7) Hein, G. 1991
- 8) Jonasson, D. H. 1992
- 9) Merrill, M.D. 1991
- 10) Miffin, J. 1998
- 11) Perkins, D. N. 1991
- 12) Wilson, B. 1995

1) Basiel (1998) [2.7]

- * Knowledge is actively constructed in the mind of the student
- * Learning is embedded in a social experience
- * The use of multiple modes of representation (multimedia) is encouraged
- * The sense of ownership and voice in the learning process is encouraged
- * Motivation prompted through interactivity is an important part on learning

2) Boyle (1997):

Boyle, T. (1997) Design for Multimedia Learning - Pretence Hall , London

- * The student through interacting with the world constructs, tests and refines cognitive representations of the world.
- * Learning (not teaching) is the focal issue

- * The degree of the learning construct can be individual or social

3) Brooks/Brooks (1993):

Brooks, J.G. & M.G. (1993) "In Search of Understanding: The Case for Constructivist Classrooms" Alexandria, VA: Association for the Supervision and Curriculum Development

- * Encourage and accept student autonomy and initiative
- * Use varied materials: raw data, interactive manipulative and / or physical objects
- * Cognitive tasks: classify, analyse, predict, create...
- * Students are allowed to drive the lesson, shift instructional strategies, alter content...
- * Student's prior knowledge is established before the tutor presents a possible solution
- * Encourage dialogue with peers and experts
- * Students are asked open-ended questions directed at collaboration
- * Students are encouraged to elaborate on initial responses to a problem
- * Students are encouraged to discuss alternate solutions presented by the tutor
- * Reflection is encouraged (wait-time) after starting a lesson
- * Time needs to be given for the student to construct relationships and make metaphors with the content material
- * The learning cycle model (discover => concept introduction => concept application) should be nurtured by the student
- * Assessment should be meaningful not standardised

4) Bruner, J. (1973) "Going Beyond the Information Given", NY - Norton

- * Instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness).
- * Instruction must be structured so that it can be easily grasped by the student (spiral organisation).

- * Instruction should be designed to facilitate exploration and / or fill in the gaps (go beyond the information given).

5) Cunningham (1993):

Cunningham, D.J. (1993) "The textbook of the future" in Hypertext: A Psychological Perspective - Ellis Horwood

- * provide experience of the knowledge construction process
- * provide experience and appreciate of multiple perspectives
- * embed learning in realistic and relevant contexts
- * encourage ownership and voice in the learning process
- * embed learning in a social process
- * encourage the use of multiple modes of representation
- * encourage self-awareness of the knowledge construction process

6) Funderstanding (1998): [2.4]

- * Learning is a search for meaning
- * Meaning requires understanding wholes as well as parts
- * An understanding of student mental models that are used to perceive the world and the assumptions they make to support those models is needed
- * Purpose of learning is for the student to construct their own meaning
- * Teacher's role is to guide students with open-ended dialogue to make connections between facts and foster new understanding
- * Assessment is not standardised but part of the learning process (i.e. - peer review)

7) Hein (1991):

Hein, G. (1991) "The museum and the needs of people" ICOM-CECA Conference 1991

- * focus on the learner in thinking about learning (not the subject/lesson)
- * there is no knowledge independent of the meaning attributed to experience (constructed) by the learning or community of learners
- * learning is an active process in which the learner uses sensory input and constructs meaning out of it
- * people learn to learn: learning consists of both constructing meaning and systems of meaning
- * the action of constructing meaning is a mental process
- * learning involves language which influences the process of learning
- * learning is a social activity intimately associated with others in the experience
- * learning is contextual. we learn in relation to prior knowledge
- * learning takes time. for significant learning to occur ideas must be revisited
- * motivation is a key component to learning

8) Jonasson (1992)

Jonasson, D.H. (1992) "Constructivism and the Technology of Instruction: A Conversation", Hillsdale -NJ: Lawrence Erlbaum Associates

- * Provide multiple representations of reality, thereby, avoiding over simplification of instruction by representing the natural complexity of the world.
- * Focus on knowledge construction, not reproduction.

- * Present authentic tasks rather than abstract instruction.
- * Provide real-world, case-based learning environments, rather than pre-determined in instructional sequences.
- * Foster reflective practice.
- * Enable context- and content- dependent knowledge construction.
- * Support collaborative construction of knowledge through social organisation.

9) Merrill (1991):

Merrill, M.D. (1991) "Constructivism and Instructional Design", Educational Technology- p.45-53

- * knowledge is constructed from experience
- * learning is a personal interpretation of the world
- * Learning is an active process of meaning-making based on experience
- * Learning is collaborative with meaning negotiated from multiple perspectives occurring in a (situated) realistic setting
- * Testing should be integrated with the task, not the separate activity

10) Mifflin (1998): [2.6]

- * Constructivist knowing assumes the active and proactive nature of all perception, learning and knowledge
- * Prior knowledge and experience is the springboard for useful; personal knowledge construction
- * Constructivist learning experiences include reflective thinking and productivity
- * Authentic activity should include student collaboration and consideration of multiple perspectives

- * Students should be able to have access to content area experts who can model domain-specific skills
- * The teacher's role is that of a mediator to provide a learning environment that facilitates increased understanding and skill

11) Perkins (1991):

Perkins, D. N. (1991) "Technology Meets Constructivism: do they make a marriage?" Educational Technology, 31. no. 5

- * The student needs the ability to generate problems in a problem-solving setting.
- * Students can engage in collaboration.
- * Students appreciate multiple perspectives.
- * Students evaluate and actively use knowledge.

12) Wilson (1995) [3]

Wilson, B. (1995) " The Impact of Constructivism (and Postmodernism) on 1D Fundamentals" - in Instructional Design Fundamentals: A Review and Reconsideration - Englewood Cliffs NJ: Educational Technology Publications

- * Reflection is a key competent of learning to become an expert
- * Instruction and assessment should be based on multiple perspectives
- * Learners should participate in establishing goals, tasks and methods of instruction and assessment

APPENDIX B

Web-based Learning Shell Evaluations

- 1) A WebCT analysis from:
<http://www.ctt.bc.ca/landonline/choices.htm> <last visited 10/4/99>
 - 2) A summary table - critical analysis
-

A WebCT analysis from:

<http://www.ctt.bc.ca/landonline/choices.htm> <last visited 10/4/99>

The information below describes the software features for WebCT:

General:

- 1) Bookmarks webct keeps track, on a per-student basis, the most recently visited page of content. When the student returns to a course WebCT can place that student back at that same position and in the same context in order to allow a quick return to learning.
- 2) Multimedia "audio" and "video" tools allow the addition of multimedia clips to any page of content. The clips can be categorized and are presented in a table by WebCT for viewing by the student.
- 3) Security Access control to all WebCT courses is guarded by username and password. WebCT recognizes the category of user by their username and presents the appropriate view. Course designers also have the ability to allow students to create their own accounts.

Asynchronous Sharing

- 1) E-mail supports searching. E-Mail is also integrated into student tracking and grade maintenance tools enabling lists of students with particular grade or participation characteristics to be sent group e-mail.
- 2) BBS file exchange The conferencing tool is multi-fora, threaded, and searchable.
- 3) Newsgroups supported

- 4) Synchronous Sharing
- 5) Chat Supported - Enables chat within same course, or outside course to any course on same server. Chat conversations can also be saved and read by instructor.
- 6) Whiteboard White board tool supported
- 7) Application sharing not supported
- 8) Virtual space not supported
- 9) Group browsing not supported
- 10) Teleconferencing not supported
- 11) Videoconferencing not supported

Student tools

- 1) Self assessing supported for quizzes - automatically marked questions associated with course content.
- 2) Progress tracking supported and can optionally be released to students. Examples include student-centered (first access date, most recent access date, histogram showing detailed access ratios to all parts for course for this student, conferencing tool readings and contributions, etc) and content-centered (number of accesses to each page of content, average time spent on each page of content, etc).
- 3) Searching: supports searching course notes as well as discussions.
- 4) Motivation building: Students can have their own home page for the course and a student homepage generation tool is for students to build their own homepages in a webct course w/o any html knowledge.
- 5) Study skill building: Support for on-line note taking
- 6) Study-guide generation of topics selected by student: Students can view their grades on-line (and performance of rest of class)
- 7) Students can change their passwords on-line
- 8) Students can return to their most recent learning context with "resume session" tool

Private content annotation

- 1) Course planning supported also the "link" tool can be used to add a URL reference to any page within or outside the WebCT course. Progress tracking is done on the number of times that link is followed.
- 2) Course managing Supported - examples include student account management, grades maintenance, statistical summary of grades for instructor and (optionally) students. Also supports manual or automatic division of students into groups, and the assigning of a presentation area and private conference forum to each group. Also a "calendar" tool for group/class

Scheduling

- 1) Course customizing Course Revising - revisions done easily, on-line (via the web), within WebCT

Course monitoring

- 2) student -centered progress tracking (first access date, most recent access date, histogram showing detailed access ratios to all parts for course for this student, conferencing tool readings and contributions, etc)
- 3) Content-centered progress tracking (number of accesses to each page of content, average time spent on each page of content, etc)
- 4) On-line quizzes - shows who has done quiz, who is doing quiz, who has yet to begin quiz, which quizzes have yet to be marked, and automatically enters grades into management system.
- 5) Tools for the site administrator to show resource usage such as course numbers, course sizes, creation and modification dates, and student enrollments.

Lesson

- 1) Instructional designing templates for the construction of various kinds of standard pages such as course outlines, assignments, reading list, etc.
- 2) Presenting information: Some limited support with common icons and shared functions and several forms of presenting information: via conferencing tool, via single-pages of content, via "paths" of content (WebCT automatically provides multi-page content with navigation mechanisms, tool-bars, etc), via URL on-line and linkable glossary support on-line course index support homepage "message" support

Testing Supports both practice quizzes and lab quizzes:

- 1) Managing records WebCT authenticates all users by username and password, and presents the appropriate view of the course depending on the user class. There is also an option that allows students to create their own accounts, if desired by the course designer. WebCT also allows the creation of an external "Welcome" page which can be accessed by anyone without an account on that course. Records management allows (for example) addition of students change of passwords maintenance and distribution of grades and statistics queries to show, compare and analyse subsets of students according to any search characteristic addition of arbitrary content categories to student records (for example but not limited to, section number, attendance, comment, etc) much like a spreadsheet.
- 2) Analyzing and tracking: Supported with basic statistical analysis

Building knowledge:

- 1) The group presentation areas allow students in a group to author and present web-based material to the class. These presentations can become (at the discretion of the designer) a permanent or long-lived component of the course. Also students can make public annotations associated with any page of course content using the conferencing system. The designer has the option of placing a conference button on any page of content. When the student accesses the conference there, the assumption is that the post being made is related to that content page. The post, while also appearing in a special forum of the main conference, remains associated with the page of content. Also, all follow-ups of that post also remain associated with that page. The intent is that new students will be able to quickly access all questions/comments/annotations that have previously been made about that page by clicking on the conference button at the top of the page. Also, if such a post is viewed from the main homepage, the subject is a link which displays the page itself, allowing everyone to see the context that the student was in when they made the post.
- 2) Team Building supports manual or automatic division of students into groups, and the assigning of a presentation area and private conference forum to each group.
- 3) Building motivation not supported

Administration

- 1) Installation Supported with optional technical support arrangement

- 2) Authorization - All courses are access controlled, as is the administration interface. The administrator has tools for authorizing courses. The course designers have tools for authorizing tutors and students.
- 3) Registering not supported
- 4) On-line fees handling not supported

Security

- 1) Course passwords must be reasonable (in terms of content and length) or will not be allowed.
- 2) WebCT server can be installed as a regular user to minimize security concerns

Resource monitoring:

- 1) WebCT admin interface provides resource usage info such as disk usage per course, number of student accounts per course, etc.
- 2) Remote access: WebCT administration (not just course design) is all web-based.
- 3) Crash recovery: Supports local backup of the desktop by the instructor (also for course transfer to another server)

Help desk

- 1) Student support - on-line help for conferencing system and e-mail. Rest of tools have small descriptions.

Instructor_support

- 2) Full, on-line, context sensitive help, also available as separate manual (130 pages) on-line tutorial document to get first-time users up and going.
- 3) Webct-users mailing list

Tech Info Overview:

- 1) Server Platform: RAM 64MB or 128MB if using Win NT
- 2) Disk Space: 10MB plus 2MB per course and 30-70k per student

WindowsNT_4.0_Server , Apple_Server , Unix_Server

- 1) Client_Platform: Minimum_Level level2 - Target_Level level3

Pricing:

- 2) Start-up Cost: free
- 3) On-going Cost: 50 to 0.5 cents per student per month, (unlimited licence is \$3000US/year) <http://homebrew.cs.ubc.ca/webct/get/pricing.html>
- 4) Technical Support: available via list server

Limitations of package

- 1) Number of courses
- 2) Number of students per server
- 3) Number of connections
- 4) Number of instructors
- 5) Other Limitations
- 6) Extra Considerations

Options

Exit Considerations: online educational delivery applications: a web tool for comparative analysis (OLIN mirror site) Last updated 07-25-1999 21:33:58

2) A summary table - critical analysis

URL: <http://www.umanitoba.ca/ip/tools/courseware/evalmain.html>
<visited 10/4/99>

Home	More	UMinfo	destinations
Model	UMinfo home	<input type="button" value="Go!"/>	

Pros/Cons Tools for Developing Interactive Academic Web Courses

	FEATURES	LEARN SPACE	TOP CLASS	WEBCT
Examples	No HTML knowledge required to develop course material	NO	NO	NO
Tools	No HTML knowledge required to develop quiz material	YES	YES	YES
Evaluation	Password and username security	YES	YES	YES
Resources	Desktop based file management for uploading to server	NO	NO	YES
Contact Us	Automated glossary tool	NO	NO	YES
	Automated index tool	NO	NO	YES
	Search tool for course material	NO	NO	YES
	Student can make private annotations of course material	NO	YES	YES
	Student presentation area	NO	YES	YES
	FEATURES	LEARN SPACE	TOP CLASS	WEBCT
	Instructor can assign specific course material to individual or group of students	NO	YES	NO
	Multiple choice self test tutorial questions - (automatic marking)	YES	YES	YES
	"Fill in the blank" self test tutorial questions - (automatic marking)	YES	YES	YES
	Customized feedback to tutorial questions	YES	YES	YES

Redirect path of tutorial depending on question answers	NO	YES	YES
Timed quizzes (graded with permanent mark retention)	NO	YES	YES
On line marking and grades management of timed quizzes	NO	YES	YES
Generate random set of questions from a pool	NO	YES	YES

FEATURES	LEARN SPACE	TOP CLASS	WEBCT
----------	-------------	-----------	-------

Student access and progress data available	NO	YES	YES
Student can view own grades and compare to class summary data	NO	NO	YES
Course Electronic Mail	NO	YES	YES
Course bulletin board	NO	YES	YES
Course chat facility	NO	NO	YES
Logged chat	NO	NO	YES

Pricing and support

Learning Space is free for the moment (authors are considering a commercial release in the future). No formal support is offered (or probably needed), other than casual email with the authors.

TopClass

WebCT

ToolBook II (Librarian priced separately on request)

The University of Manitoba - Winnipeg, MB, Canada R3T 2N2, 1-800-474-7800

Questions or Comments? www@umanitoba.ca

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APPENDIX C

Middlesex Research Society Template Guidelines

Dear MRS Member,

We are encouraging everyone to contribute to our new website, URL:

<http://www.mdx.ac.uk/MDX/research/MRS.htm> ,

It will soon be on line, so have a visit and tell us what you think.

To help you we have made a Fill-in-the-tags document. This simply means you look for two keywords throughout the document to complete it. If you already have a home page give us your URL and we will link to it.

Your URL:

Directions:

1) NOTE: means follow these directions, but leave the text intact

2) DELETE: means to erase the word DELETE and all text after it to one of these marks: (<) or Then replace it appropriately.

i.e. -

<P>If you would like to e-mail me

click here ~

Becomes:

<P>If you would like to e-mail me
click here

3) FILE NAMES:

There are two parts to the file name directions:

A)

First you must construct the name of the file for the directory

i.e. -

<L>DELETE: Write your abstracts name here

Becomes:

<L>DELETE: Write your abstracts name here

Whereas:

- The first two letters are your initials (First letter of your first name, first letter of your surname)
- type in an underscore
Type in the letters : ABST (for abstract)
Type in the number of the abstract file (i.e.- 1, for the first etc
Type : full stop (.) then the letters htm (file name extension)

B)

Type the name of the article:

i.e. -

<L>DELETE: Write your abstracts name here

Becomes:

<L>The Effects of Pollution on Dead Cows<A>

C)

Repeat the same process for your papers with these differences:

<L>DELETE: Write your abstracts name here<A>

Whereas:

- * The first two letters are your initials (First letter of your first name, first letter of your surname)

* type in an underscore
 * Type in the letters : PAPR (for paper)
 * Type in the number of the abstract file (i.e. - 1. to the first, 2 for the second, etc
 * Type : full stop (.) then the letters htm (file name extension)
 Sample forms will be mailed as separate documents.

yours, Anthony "Skip" Basiel- MRS Sect. </HTML>
 <!-- DELETE: your name goes here. SEE NOTES -->

<HEAD><TITLE> DELETE: your name goes here</TITLE><IHEAD>
 <body BGCOLOR="#=TEXT="#000000" LINK=W5544W'
 VUNK=W990022,9>
 <IMG alt--" [Middlesex Research Society Logo]" align=right SRC=" logo. GIF
 '5

 MRS Member Abstract:

 <HR>
 <H1>Written by:</H1>

<H 1>DELETE: your name goes here</I></H 1>

<CENTER>DELETE: Your abstract title goes here</CENTER>

 <BODY>

<P>DELETE: Place the body of the text of your abstract here. Place
 <!--this symbol: <P>
 -> in front of each new paragraph.

 <P>
 <I><CENTER>This document was last updated: 1 1
 </CENTER></I>

<!--NOTE: Please enter the six digits for today's date

 <HR>

 <P>
 <I>To see the complete paper click
 here.</I>
 <!--NOTE: Please type in your paper name above -->
 <HR>

<CENTER> <A HREF="MRSltm'5HOME<A> 1 SEARCH j HELP 1 BACK
<IBODY><p>The previous <A HREF="/www/old-welcome.html

</HTML>

<!-- DELETE: your name goes here. SEE NOTES -->

<HEAD><TITLE> **DELETE: your name goes here**</TITLE></HEAD>

<body BGCOLOR="#ffffff"TEXT="#000000" LINK="#5544FF"

VLINK=W990022,,>

<IMG alt=" [Middlesex Research Society Logo]" align=right

SRC=9ogo.GIF">

 MRS Member Paper:

<HR>

<H1>Written by:</H1>

<H 1 ><DELETE: your name goes here</l></H 1 >

<CENTER>**DELETE: The Title of your paper goes
here**</CENTER>

<BODY>

<P>**DELETE: Place the body of the text of your paper here.** Place <!--this
symbol: <P> -->

in front of each new paragraph.

<P>

<I><CENTER>**This document was last updated: 1 1**

</CENTER></I>

<!--NOTE: Please enter the six digits for today's date -->

<HR>

<P><>I look forward to your comments. Please <A

HREF="DELETE:enteryoure-mailusername@mdx.ac.uk">click

here to send me an

e-mail. Thank You.<>

<HR>

<CENTER> HOME<A> 1 <A

```

    HREF="/mdx/tech/SEARCH.html">SEARCH</A> 1 <A
    HREF="/mdx/tech/HELP.html">HELP< /A> 1 <A
    HREF="abst.htm">BACK</A></B>
</font></BODY><p>The previous <A HREF="Vw~old - welcome.html
'5Middlesex University Home Page<A><br> is still available during the
transition period from
the old system to the new.</CENTER>
<center><FONT SIZE=2>The Middlesex University <A
    HREF="/MDX/server/server.html">server</A> is <A
    HREF="mailto:andy4@,mdx.ac.uk">coordinated</A> by MRS</FONT
SIZE><center>
</BODY>
</HTML>

```

APPENDIX D

IT Case Study Transcripts

1) Transcript from video tape and printouts of HTML forms

2) IT tutorial web links

1) Transcript from video tape and printouts of HTML forms

Legend:

Student 1 query = S1

Student 2 query = S2

Tutor Response = A "N", where "N" is the number listed chronologically of the answer

S1: Are there facilities to make notes?

A1: There are two solutions. First, use the bookmark feature to keep a URL. Next, open a word processing package and toggle (Alt + Tab) between the programs. Alternately you can create a split screen effect outlined in the tutorial help system.

S2: Can you take the problem with you? Can you have access to the problem throughout the lesson?

A2: Same solution offered from A1.

S2: How do you get to the start problem page?

A3: Click the menu bar on the top left of every HTML page.

<General discussion revealed a bad link on the Start Problem Page menu bar. The solution was to use a similar text link in the body of the content >

<Students search quietly on the web for several minutes>

S1: What is the best way to use the search engine?

A4: The two recommended strategies are to, first, use the same key words in different search engines. Next, using the same search engine, try different key words.

S2: Should you use internal links or search the Internet?

A5: Both. The internal links are just starting points suggested by the tutor.

<Students search quietly on the web for several minutes>

<Discussion between students on the sites they had found>

S2: What is a Javascript Alert? <points to prompt box on the screen>

A6: This means that there is a Javascript error on the page. Click OK and continue.

<Students search quietly on the web for several minutes>

< The PC crashes for Student one. She moves over to the next computer which was previously set up>

S1: Do all websites come up from the search engine?

A7: see answer A4.

<Students search quietly on the web for several minutes>

S1: What other ways are there to get information on the web besides search engines?

A8: Two recommended strategies in the DELBERT Tutorial system are; to join a news group or e-mail a subject expert (i.e.- university professor, museum curator, etc.). Due to time restraints neither will be done today. One advantage of using this system is flexibility in use. For example, an e-mail could be sent out in the morning and retrieved at night after you return home from work.

S2: Why is the (university) network so slow? [Prompted by a several minute wait to a search query]

A9: The university network is over burdened by the large number of users. Using a modem at home will also have restrictions. One suggestion is to save a page locally and then work off-line. With Windows 95 you can switch to another program while you wait for a file to download.

S2: What can be done if you don't want to wait any longer for a link to connect?

A10: Simply click the Stop button on the menu or the escape button.

[Time for searching is complete. Students are prompted to submit first solution. See data in the table 6.420 below]

startProblemSubmit1: Submit Comments Date: 28/01/98 Time: 12:40:15 Remote User: Comments S.stanley@mdx.ac.uk No web sites found in the time allowed.	startProblemSubmit1: Submit Comments Date: 28/01/98 Time: 12:41:07 Remote User: Comments j.lilly@mdx.ac.uk/ I do not have an answer at this time. There are several reasons for this - limited time available for search, inexperience of using Internet and refining Web searches. None
---	--

Start Problem: Submission Results

[Students are prompted to enter responses to the Start Problem questionnaire.]

IT Pilot Case Study: Start Problem Web Survey

startProblemGOAL: yes
StartProblemGoal: YES
startProblemSubmit: Submit Form
Date: 28/01/98

StartProblemOpenText:

It would have been useful to have starting web site address
 this would have cut down the time spent searching the web

startProblemGOAL: yes
StartProblemGoal: YES
startProblemSubmit: Submit Form
Date: 28/01/98

StartProblemOpenText:

The time limitation has meant that I have not had time to read the background information.

**

ModelGOAL: V1
BackGroundMODEL1: YES
Date: 28/01/98

ModelAnswer:

startProblemGOAL: false
StartProblemGoal: YES
startProblemSubmit: Submit Form
Date: 30/01/98

StartProblemOpenText:

The question implies that I know what the National Curriculum is. My question is, what is the National Curriculum? Is it the same as the background information concerning the SCAA? Other than that, the question (goal) is asked in a straight forward manner that I have no problem identifying with. Secondly, your background material is directly related to the Goal. I Like it.

Minor comments concerning the background material: Use same font types for all

(SCAA is in italics); It would be nice if you could provide an online reference or URL to each of the three references so I don't need to hunt for them myself; the page design for browsers with graphics turned off is too constrained with much white space all around every text area or box.

Please use accessibility standards when designing web pages, see [<http://server.berkeley.edu/~cdaveb/anybrowser.html>] For instance this box is only 2 lines long on my browser and centred in the middle one-third of my screen. Sure is hard to see what I have written.

startProblemGOAL: false
StartProblemGoal: NO
StartProblemSubmit: Submit Form
Date: 22/06/98

StartProblemOpenText:

I understood what the background material was saying, but I didn't understand what that had to do with the goal--what are you trying to say about the goal

with the background material?

startProblemGOAL: yes
StartProblemGoal: YES
StartProblemSubmit: Submit Form
Date: 14/07/98

StartProblemOpenText:

startProblemGOAL: yes
StartProblemGoal: YES
StartProblemSubmit: Submit Form
Date: 18/10/98

StartProblemOpenText:

[Searches and discussion continued for the sample solution and second conclusion]

S1: Is there a problem using the internet from home?

A11: There are two problems. First, the phone lines are blocked. Second, you have to pay for the time on the phone.

S2: I don't see my submission.

A12: Be sure to reload the browser after you submit the response to see the updated page.

[Students were then prompted to examine the sample solution and enter their second answer. See table 6.422]

IT Pilot Case Study Second Solution Transcripts

Solution2entry:

Submit 2nd Solution Entry

Date:

28/01/98

Time:

13:06:59

Remote User:

Comments

S.stanley@mdx.uk TTA website page unclear, as no information on how to use the page. more time needed to become fluent with the system

Solution2entry:

Submit 2nd Solution Entry

Date:

28/01/98

Time:

13:13:13

Remote User:

Comments

In the limited time available I did manage to visit the 3 suggested top sites and the SCAA site. Because of my limited experience on the Internet I do not feel qualified to comment on whether they were the best but I was impressed with what I saw.

Additional developmental data is in the form of e-mail correspondence leading to the development of the pre-pilot study.

2) IT tutorial web links

Welcome to the DELBERT WEBLINKS Page.

This page is composed of four main parts:

- 1.FIRST-TIME USERS: WEBLINKS STRATEGIES
- 2.SEARCH TOOLS
- 3.ON-LINE REFERENCES
- 4.NEWS GROUPS / BULLETIN BOARD SYSTEMS
- 5.ACTIVE LINKS Page: Your contributions

TOP

1) FIRST-TIME USERS: WEBLINKS STRATEGIES

TO START
FIRST TIME USERS
START STRATEGIES

NOTE: Some of the following section is made up of text from :

NETTRAIN@LISTSERV.ACSU.BUFFALO.EDU

TO START:

Critical Review of Data

- 1.Define the data source. (Objective v. Subjective)
- 2.Define Author's credentials (Ph.D. ?)
- 3.Refereed v. Draft Documents
- 4.Research Results v. Opinions

"The Internet is like a huge library, except people keep bringing in new books and putting them on the shelves without telling the librarians

where they are putting the books. So the librarians are scrambling around after the fact trying to bring a sense of organisation to the library. Interestingly enough, the librarians have split into 2 factions: the Traditionalists and the Indexers. The Traditionalists have tried to organise the information in the same way you would expect to find it in a library, broken down by major topic area into subtopic areas such as Entertainment: Music: American: Jazz: Alto Sax: Charlie Parker. The indexers have decided to take the approach of using robots to read every word in every book and index their results as they go. Using this methodology, a search for "Charlie Parker" will bring up the name of the book that contains that phrase the highest number of times. "

Jim Mack < jimmack@hotmail.com >

Once you get to a new web site you have a new challenge. You then "have to" navigate the site, find the search tool, attempt to learn how this particular tool works/what it covers, and then search. While this "fact of the net" is more to add to a presentation, it is crucial to note that these resources may be holding the answer(s) they need. Useful and valuable info does exist on the Internet. However, a lot of it may not be found using a "general" search tool.

Gary Price < gprice@gwis2.circ.gwu.edu >

FIRST TIME USERS -

The focus is on general information locating concepts; we try to stress the connection between "real-world" search strategies and transfer of these skills to Internet search tools. We then delve into the world of formulating keyword searches and supporting <Glossary LINK> Boolean expressions. The point here is to develop a comprehensive word list to aid in creating complex search statements. Then, we survey several *different* search engines: Infoseek, Lycos, Excite, AltaVista, Hotbot, etc. The emphasis here is exploring each engine's unique functions, as well as noting any similarities. We move on to <Glossary LINK> meta search tools, as has been mentioned. I believe we'll insert some of the new conceptual search engines such as NorthernLight and InferenceFind here, as they seem to be the next generation. Generic "trailblazers"- resource pages like the Argus Clearinghouse, and individual's resource pages. Specialised search tools such as tile.net and DejaNews to uncover non-Web resources. I have broken search tools into these categories, which helps in training:

1. Search Engines:

Alta Vista, Excite, Infoseek

2. Subject Catalogues:

MEL (<http://www.mel.lib.mi.us>),

Internet Public Library

(<http://www.ipl.org>), Yahoo

3. Meta Search Engines:
Dog Pile, ProFusion

4. Subject Specific Search Engines:

I have the students do a search using Yahoo with the key words search engine.

Ashima Saigal <asaig@hopper.com >

Once you get to a new web site you have a new challenge. You then "have to navigate the site, find the search tool, attempt to learn how this particular tool works/what it covers, and then search. While this "fact of the "net" is more to add to a presentation, it is crucial to note that these resources may be holding the answer(s) they need. Useful and valuable info does exist on the Internet. However, a lot of it may not be found using a "general" search tool.

Gary Price <gprice@gwis2.circ.gwu.edu >

Suppose you know that the search engine for the Boston Area Mechanics List is called BBN but you forget the Boston Area MechanicsList and only remember BBN. Try DogPile, MetaFind and Inference on BBN and tell me which one turns up the answer the quickest. See how many Bolt Beranek and Newman you receive. Searching on my name <Gerald E. Boyd> won't do much good until you go to DejaNews where I appear almost 1600 times. Yahoo only has the correct one listed about 10 times in the first 60 matches. Likewise with AltaVista. Patrick Crispin only appears 5 times in DejaNews. So Patrick Crispin and the RoadMap series is catalogued in more places on the Internet than I, but I answer more questions that are catalogued on the Internet. Like I said, it depends upon what you do...

Gerry Boyd <gboyd@netcom.com >

START STRATEGIES:

For a "scholarly" topic:

1. If you have a general topic you wish to find information on use a "subject catalogue." (Yahoo, Librarian's Index, Infomine, etc.)
2. If you want to use "pre-selected" links, use an "annotated subject catalogue." (Magellan, WebCrawler, etc.)
3. If you want to find "quality" sites quickly, use a "subject guide." (Argus, WWW Virtual Library, etc.)
4. To make sure you haven't missed anything important, use a searchable index.
5. Then follow up with a meta-index for those "unmined gems."

For a reasonably simple topic where you want lots of quick results:

1. Start with a searchable index. Use a single index to develop a workable search strategy, using the advanced features of that engine and <Glossary Link> Boolean logic.
2. Then use a Meta-index to search multiple indexes

For general facts and figures:

Use a reference room (Internet Public Library, Galaxy Reference, and others)

Terry Dugas < dugast@naples.net >

TOP

2) SEARCH TOOLS

SEARCH SITES

- 1) A great way to introduce students to the Internet is to take them to <http://www.webring.org> and its comprehensive directory by category at <http://www.webring.org/ringworld/> of 250,000 sites in Webrings.

Gleason Sackman just posted in Net-Happenings an announcement about two articles describing webrings and the upcoming changes at [webring.org](http://www.webring.org), which is under new management....and is planning a big new expansion..."as an alternative to search engines."

<http://www.webweek.com/1997/10/20/markcomm/19971020-webrings.html>

<http://personalweb.miningco.com/library/weekly/aa110397.htm>

Tracy Marks < tmar@tiac.net >

Traceroute Utility

Learn to use a traceroute utility. It will show you each of the hops along the route to the site you are trying to connect to, and at which point the connection fails. If you use Win 95, there is a DOS utility built in:

tracert.exe in the C:\windows directory. For any other operating system, there are freeware utilities readily available. You can run a command like this: [tracert www.yahoo.com](http://www.yahoo.com)

This example will show you the path between you and yahoo.com step by step and how long it takes to connect to each step.

Walt Howe < <http://people.delphi.com/walthowe/> >

SEARCH SITES:

INFO	Seek
http://home.netscape.com/escapes/search/netsearch_2.html	
Netscape-	
http://home.netscape.com/escapes/search/ntsrchmd-5.html	
Excite	
http://home.netscape.com/escapes/search/netsearch_1.html	
Yahoo	
http://home.netscape.com/escapes/search/netsearch_4.html	
Lycos	
http://home.netscape.com/escapes/search/netsearch_3.html	
AOL	NetFind
http://home.netscape.com/escapes/search/netsearch_5.html	
HOTBOT-	
http://home.netscape.com/escapes/search/netsearch_6.html	
LookSmart	
http://home.netscape.com/escapes/search/netsearch_7.html	
C/NET Search.com -	
http://home.netscape.com/escapes/search/netsearch_8.html	
WebCrawler	
http://home.netscape.com/escapes/search/netsearch_9.html	
Microsoft Magazine Search Tool:	
http://library.microsoft.com/compmags.htm	
The SEARCH WIZARD will help you add words to your	
search list. TRY IT	
OUT!	

IMAGE SEARCH ENGINES

Yahoo's Image Surfer
<http://isurf.interpix.com/>

Gif Wizard Image Search
<http://www.raspberryhill.com/gifwiz/search.html>

Web Places 4-engine Clip Art Searcher
<http://www.webplaces.com/search/>

Lycos Pictures and Sounds Searcher
<http://www.lycos.com/lycosmedia.html>

InfoSeek's Image Seek
<http://www.imageseek.com>

Art Search

<http://www.artsearch.net/artsearch/>

Barry's Clip Art Server

<http://www.barrysclipart.com/>

Hot Bot's Image Search (choose media type)

<http://www.hotbot.com>

The Amazing Picture Machine

<http://www.ncrtec.org/picture.htm>

Cyber411 Multi-engine Image Searcher

<http://www.ist.net/clipart/imsearch.html>

Wustl.edu's Image Finder

http://wuecon.wustl.edu/other_www/wuarchimage.html

Excite's Image Search

<http://www.precisionimages.com/search/search.htm>

WebSeek Image and Video Search

<http://www.ctr.columbia.edu/webseek/>

(links from <http://www.windweaver.com/searchpage9b.htm>)

Tracy Marks, M.A. tmarr@tiac.net <http://www.windweaver.com/>

DogPile : <http://www.dogpile.com/>

MetaFind: <http://www.metafind.com>

Searching the NET:

<http://www.scout.cs.wisc.edu/scout/toolkit/searching/index.html>

Search Tools and Directories:

<http://gwis2.circ.gwu.edu/~gprice/direct.htm>

Liszt Search:

<http://www.liszt.com/cgi-bin/liszt.cgi?form=options>

<http://gwis2.circ.gwu.edu/~gprice/direct.htm>

AskERIC: ASK Eric

<http://ericir.syr.edu/>

http://ericir.syr.edu/Virtual/Listserv_Archives/disted-l.html

http://ericir.syr.edu/Virtual/Listserv_Archives/edtech.html

<http://www.h-net.msu.edu/~edweb/>

<http://ericps.crc.uiuc.edu/ecce/listserv.html>

Newspapers can be a good source of information

TOP

3) ON-LINE REFERENCES

This section is composed of these parts:

1. On-Line Libraries
2. FTP Sites
3. ILIAD
4. Specialised Directories
5. Museums
6. Miscellaneous

Note: A good place to start - Zdnet's new HTML users training area - about 20 tutorials and articles
<http://www.zdnet.com/products/htmluser.html>

1) On-Line Libraries

Excellent article with great library links: Online Libraries are Great Research Tools

<http://www.nytimes.com/library/cyber/sites/110397sites.html>

Public Libraries with WWW and Gopher Services (over 500 - some links are broken)

<http://sjcpl.lib.in.us/homepage/PublicLibraries/PubLibSrvsGopherWWW.html#wwwsrv>

U.S. Public Libraries with Web Sites (new url and update 11/4/97)

<http://www.capecod.net/epl/public.libraries.html>

<http://gwis2.circ.gwu.edu/~gprice/direct.htm#Ready Reference>

PowerPoint Presentations (55 slides) on Mailing Lists

<http://ourworld.compuserve.com/homepages/ajra/maillingl.htm>

Tracy Marks < tmarr@tiac.net >

MICROSOFT LIBRARY: <http://library.microsoft.com/>

University of Waterloo Electronic Library -

Resources of Scholarly Societies by Subject links to over 1100 scholarly societies/resource centres on the Internet in about 30 categories (e.g. psychology, anthropology, dance, law). Further information on the Scholarly Society project is at

<http://www.lib.uwaterloo.ca/society/overview.html>

TOP

2) FTP Sites:

The top 10 ftp sites

<http://www.cnet.com/Content/Reviews/Compare/Ftp/ss12.html>

Some highly recommended sites include Walnut Creek ftp.cdrom.com and Papa Winsock papa.indstate.edu, with Arizona Mac Users group ftp.amug.org recommended for Macs.

The top 9 ftp clients

<http://www.cnet.com/Content/Reviews/Compare/Ftp/ss01.html>

Bullet-Proof FTP is their pick.

TOP

3) ILIAD:

ILIAD searches the Internet offline via email or the Web. If you have email - you can search the Web!

HOW DO I USE ILIAD?

1.Type an E-Mail message in the format listed below. You can save this formatting your email address book so each email only requires that you enter the keywords.

2.Questions should be keywords relevant to your request. Avoid command cross-disciplinary words. Select narrow, unique search terms that are focused on your topic. Submit 1 query per E-Mail.

3.E-mail your request to: iliad@algol.jsc.nasa.gov

4.The format required is: Subject: iliad query ?Q : your query keywords

SPECIAL OPTION

A special URL option exists for those who have Web browsers and would prefer their answers as a list of hyperlinks in an html document. This option functions primarily as a time saving device. Searches are performed independently and the results are emailed as an html document. If you request this option, save the email you receive as xxx.html and bring it up in a Web browser as a local file.

Example: Subject: iliad query
*OutputType : urls
?Q : your query keywords

For more information visit the following URLs:

<http://www.jsc.nasa.gov/stb/iliad.html> (GUI page)

<http://www.jsc.nasa.gov/stb/iliadtxt.html>
(text-only page)

TOP

4) Specialised Directories:

Cover kinds of data (e.g., email addresses, web server information) that require special tools for effective searching from:

<http://wwwscout.cs.wisc.edu/scout/toolkit/searching/index.html>

"Direct" links to searchable resources. Feel free to have a look: <http://gwis2.circ.gwu.edu/~gprice/direct.htm>

TOP

5) Museums:

INFO Seek:

<http://www.infoseek.com/Titles?qt=museums&col=WW&sv=N4&svx=nssb>

Excite:

<http://www.excite.com/search.gw?trace=1&search=museum>

Yahoo:

<http://search.yahoo.com/bin/search?p=museums&a=n>

Lycos: <http://www-uk.lycos.com/cgi->

bin/pursuit?query=museums

HOTBOT:

http://www.search.hotbot.com/hResult.html/?_v=2&SW=web&SM=MC&MT=museums&act.search.x=73&act.search.y=12

LookSmart:

<http://www.looksmart.com/r?comefrom=nspanel-search&key=museums&search=1&submit.x=26&submit.y=11>

C/NET Search.com :

<http://www.search.com/Infoseek/1,135,,0200.html?COLL=WW&QUERY=museums>

WebCrawler:

<http://webcrawler.com/cgi-bin/WebQuery?searchText=museums&src=ns>

TOP

6) Miscellaneous:

UNIVERSITY SITES

This is just one location. Do a search for more information:

<http://www.mit.edu:8001/people/cdemello/univ.html>

NetLearn: Internet Learning Resource Directory

<http://www.rgu.ac.uk/~sim/research/netlearn/callist.htm>

International Federation for Information Processing

<http://www.ifip.or.at/>

Ed. Tech. Resource Centre

<http://www.pws.com/canit/canit.html>

Cyber Prof at UofIllinois (RESOURCE PART)

<http://loner.ccsr.uiuc.edu/cyberprof/>

LEO: Librarians and Educators Online

<http://www.leonline.com/>

NetLingo has a great site for web related terms. - Check it out!

Magazines

Microsoft Computer Magazines List:
<http://library.microsoft.com/scripts/ezones.idc?term=%%>

Newspapers

Newspapers can be a good source of information

On-line Encyclopedia

This On-line encyclopedia has a search tool.

TOP

4) NEWS GROUPS / BULLITIN BOARD SYSTEMS

1) Apart from the Internet Classroom Assistant at <http://www.nicenet.org> , which I heartily recommend, you can get a free online message board to use personally and professionally at: <http://www.dboard.com/msgboards>

It's an easy way for instructors and students to leave messages for each other, and for beginning Internet students to practice participating in online life.

2) Info about classnet is to be found on:

<http://www.macatawa.org/~minicom/>

3) Here's a neat little way to find something within a particular newsgroup. Go to <http://www.dejanews.com> and enter the following into the Search field: keyword & ~g (name.of.newsgroup)Whereby:

"keyword" is the info you are searching for (no quotes). More than one keyword may be entered separated by spaces and an "&" but no other symbols. "name.of.newsgroup" (no quotes) is the name of the newsgroup you want to search in. Make sure that it is enclosed within parentheses and is preceded by "& ~g " (no quotes). This of course implies you know the exact name of the newsgroup. If you don't, then use DejaNews Interest Finder.

4) Here is a list of news groups you can join to get e-mail about a topic:

<http://www.cr.nps.gov/ncptt/irg/irg-listservs.html>

APPENDIX E

Philosophy Case Study Transcripts

The following is the results of the Philosophy Case study:

- 1) Start Problem Web Survey
- 2) Start Problem Submission
- 3) Sample Solution Web Survey
- 4) Second Solution Submission
- 5) End Web Survey
- 6) Video Conference Interview
- 7) Sample of an Annotation Page
- 8) Sample of Suggested Web Links
- 9) Samples of Active Entry Submissions

1) Start Problem Web Survey

Clear_essay_assignment: YES
Understand_Background: YES
open response submit: Send Comments - click once
Date: 05/03/98
Remote User:

Clear_essay_assignment: YES
Understand_Background: YES
open response submit: Send Comments - click once
Date: 05/03/98
Remote User:

Clear_essay_assignment: YES
Understand_Background: YES
open response submit: Send Comments - click once
Date: 05/03/98
Remote User:

P_StartEssay_OpenResponse: open response , Submit open response
Date: 05/03/98
Remote User:

test 2 , Submit open response
05/03/98

click here, [Submit - open response]
05/03/98

test from remote, [Submit - open response]
05/03/98

P_StartEssay_OpenResponse: HI from jeff, [Submit - open response]
Date: 07/03/98
Remote Name: 158.94.1.61
Remote User:

2) Start Problem Submission

First Draft Essay - Submit :
Submit First Draft Essay
Date: 21/04/98
Time: 14:57:07
Remote User:

FirstDraftEssay_Entry Form

Krista Stevens. ks139@mdx.ac.uk

Does Sartre's conception of the human condition have any moral implications?

Before answering the above question, there is another that needs to be looked at first. This being what Sartre actually meant by the human condition. After this has been examined, the question of it has any moral implications will be looked at. Sartre has the point of view that is called Atheistic Existentialism, which puts the emphasis on the individual instead of society. The main theme of this theory is the concern with the freedom of individuals. The belief in the ability of every person to choose for themselves their attributes, purposes,

values and way of life. It is concerned with not just maintaining it as a truth, but to persuade everyone to live by it as well. The only authentic and genuine way of living is that which is freely chosen by the individual themselves. In one sense, Sartre would deny that there is any such thing as human nature for there to be true or false theories about. We have not been created for any purpose, by either God or evolution. We simply find ourselves existing and then we have to decide what to do and make with ourselves. Seeing that we choose what to do with ourselves, it makes redundant the redestination theory, of which God is said to have for each of us. A clear saying for this is, "we are anything that we choose to be". This saying may be seen to sum up existentialism as a whole. In his view, we are condemned to be free. There is no limit to our freedom, apart from the fact that we are not free to cease to be free. We cannot rely on others to make our decisions for us, with particular reference to God. Without God to tell us what to do using the Bible or other religious works, we cannot fall back onto what is in them to excuse our actions. Sartre uses the term anguish to describe the consciousness of a man's own freedom. Anguish is not the fear of an external object, but the awareness of the unpredictability of man's own behaviour. It is also the consciousness of our freedom, which is painful so we try to avoid it. This is illusory, because it is a necessary truth that we are free. One thing that does spring out from the definition of existentialism, is that if an individual is free to choose their own values, what is to stop them placing little or no value on others. Also if that person really is free to choose his own way of life, would it lead to anarchy and a breakdown of law and order. If Sartre's conception of the human condition is followed, then perhaps not. Because humans are brought up in a society where certain values are shared, these may stop the person from doing what is considered morally wrong. Saying that though, considering that the majority of morals that society has are religion based, these morals would disappear. Sartre points out that we all have to choose our values for ourselves, and that there is no simple answer to the ethical questions.

First Draft Essay - Submit :

Submit First Draft Essay

Date:

27/04/98

Time:

15:21:42

Remote User:

FirstDraftEssay_Entry Form

(MH214@mdx.ac.uk) Critically discuss Sartre's central theme that there is at least one being whose existence comes before its essence Existentialism and Humanism stands as a defense of existentialism and supports the claim that

the human condition is to labour and die in this world and that during our lives it is up to us and the choices we make to define our essence. It also stresses the freedom we have to choose for ourselves the paths we wish to follow but adds the responsibility of not only choosing for ourselves but also for all conscious beings. This view can be seen as the ethics of freedom that Sartre adopts and a way of including a moral code in a philosophy that states that there is no God or any particular guidelines to follow. It condemns us as free choosing individuals with no human nature to fall back on as an excuse and no illusions of an afterlife to guide our actions and the choices we make in this life. We have no essence and only can obtain an existence through what we make of ourselves in this life. By living as free individuals we become an existence and mould ourselves into who we are.

To express this claim that existence precedes essence Sartre uses the example of a paper knife. It is clear to see that the artisan must have had a conception of the paper knife before producing it. Only through the production of the paper knife have you determined its essence just as only through our existence and the choices we make can we become who we are and obtain an essence. From a religious view point could say that God is the artisan and only through God's conception of us are we created at all: "God makes man according to a procedure and a conception" (Existentialism and Humanism, p27). Sartre as an atheist existentialist though did not believe in God as the creator, and claimed that if God did not exist then it must be true that there must be at least one being whose existence becomes before its essence; it must exist for one to have any conception of it. The being is man and through his existence he acquires an essence through the freedom of his choices. When man takes action and makes a decision to what he will make of himself he will not become what he wishes to be until he has followed his actions through: "He will not be anything until later, and then he will be what he makes of himself" (Existentialism as Humanism, p28).

First Draft Essay - Submit :

Submit First Draft Essay

Date:

28/04/98

Time:

23:32:04

Remote User:

FirstDraftEssay_Entry Form

jk130@mdx.ac.uk

Does Sartre's conception of the human condition has any moral implications. Since ancient times, all the moral laws were based on the Gods' will.

Regardless of the country, culture or specific religious beliefs, people believed they were given commandments they lived by. Sartre, who was not the first, but one of many who opposed the traditional organisation of the civilised world. Through his Philosophy of existentialism, he offers new explanations, and how I understand his postulates- hope and an optimistic overview of human reality. This essay will examine Sartre's human condition theory which presents a new approach to morality.

What Sartre means by the human condition is simply "what never vary... having to labour and to die". Because there is no God there is absolutely nothing that is prohibited. There is no such thing as human nature, we create ourselves through our actions and acquire the essence in the course of our lives. The meaning of that is that for the first time people are with to excuse whatsoever. Any action that anyone decides to undertake is chosen freely and the responsibility lies with that person. On one hand as I said it provides no excuse, what is more important is that people are bound by no faith or destiny. Sartre says that we are condemned to be free, that "man is freedom" and therefore responsible for everything he does. This causes anxiety and despair, because so often people are faced with choices which they would have rather avoided. Sartre opposes human weakness, he says that every day of a man's life he makes choices that define him. There is no imitation. A man is free to do anything he chooses and through that he can become anything he chooses. There are no guarantees, we are free to choose but not free to succeed. Absolute freedom implies moral consequences. It is entirely up to an individual to interpret what is happening, and how this particular individual is going to react to what is happening. Even if someone decides to ask for advice it is normally predetermined by the subconscious decision who will be asked for assistance.

To illustrate his meaning Sartre uses the example of a young French boy during W.W.II undecided whether to leave his mother and join the army or stay with her and look after her. He decides to come for advice to Sartre, who then tells him that there is no such rule that can help him, that he needs to come up with an answer all on his own. The boy only knows the answer, and only he can make a decision that will reflect his state of mind. What is most important, is that there are no by God-given pro or against that he should look up to. He will make the choice and through that action he will express and evaluate his standpoint. That is only when he made the choice the others will place the judgement upon him, others might say that he was in error or not, but cannot choose his preferences.

Sartre thinks that the lack of a priori moral commandments brings ethics to the level of the arts. An artist expresses himself through his work, and he is judged upon his finished creation and not during painting or at any given moment that is preceding the final. When on the other hand we watch any work of art we do understand that what we see is the sum of circumstances in which the creation happened, state of the artists mind in the

time of creation and then we judge. Then again we could say that we do or do not like the work but we cannot say that the artist should have seen the object of his inspiration differently. It seems, however there is one value for Sartre that is the starting point in all morality and that is the universality of purpose. He says that regardless of the class or culture we can always understand another man's purpose, that we long to the same.

The bottom line is that we are condemned to freedom but also to being together. To Sartre it means that through our actions we choose not only for ourselves but most importantly for the whole of the mankind, and to choose for the humanity is to appreciate that our choice would be just as good if made by anyone else. Sartre explains that in the following manner: if we catch someone doing something we disapprove of we could ask: so what do you think would have happened if everyone did this. It does not matter for instance how many people break the law, what is important is that through our actions we say that we think it is good to do something or not.

What follows is that every man's purpose is equal and deserves the same amount of consideration and if we make a certain decision it is like saying that it would be just as good for any other person to do the same thing. Sartre's idea of human condition does not apply to one particular part of man's life. This is an explanation of the whole circle of human life, influencing every aspect of it, obviously morality amongst others. Sartre's idea of ethical principles seems strongly utilitarian and however some of his ideas might seem quite difficult to agree with, when applied to practical philosophy they seem perfectly sound. What I mean here is the theory of responsibility and choice, which might seem to cause anxiety and distress but in ethics insure the fundamental impartiality and universality. (I can try to explain that)

First Draft Essay - Submit :

Submit First Draft Essay

Date:

01/05/98

Time:

07:07:06

Remote User:

FirstDraftEssay_Entry Form

(j.mason@mdx.ac.uk)

Isn't Sartre fun?

HELP TIP: a.basiel@mdx.ac.uk

Hi Malcom -

Sorry you have troubles.

I have completed my first draft and have just attempted to paste and place it on the site. When I pasted it in the box only a random selection of the text appeared, what has happen

>>>It sounds like a memory problem.

Try this:

1) In DELBERT:

click to E-mail me again. Then paste the essay in the e-mail message. I'll post it for you.

2) Or restart the computer and be sure you are only running one program at a time. In other words:

a) In Word - copy the essay

b) close Word

c) open Netscape

d) paste the essay

>>>>Remember to CLICK THE RELOAD button in Netscape to see the new submission.

Cheers,

Skip

First Draft Essay - Submit :

Submit First Draft Essay

Date:

01/05/98

Time:

14:55:43

Remote User:

FirstDraftEssay_Entry Form

[mr168@mdx.ac.uk]

Malcolm Raymond. Short First Draft of Sartre essay.

In the early 1970s Italian artist Stefano Cantoni was invited to submit a proposal for sculpture show at the London Institute for Contemporary Art [I.C.A]. Cantonis proposal was to set up a machine gun turret above a chair in the main gallery space. The chair and machine guns were connected so that every 500th person to sit in the chair would activate the machine guns which would then fire live ammunition at everyone in the

gallery. Suffice to say, health and safety regulations prevented the I.C.A from commissioning this work. However, if this installation had been allowed it would have provided a vivid illustration of Jean Paul Sartre's existential philosophy. For the participants/viewers of the installation would have had the choice of whether to sit in chair or not. What they would not be able to choose is the consequences of sitting [unless of course they waited and counted until they would be the 500th person to sit in the chair].

For Sartre this would be an example of the absurdity of the world. In that we are free to choose but we cannot choose the circumstances in which we make our choices nor what the outcome of these choices will be. To arrive at this situation of free choice Sartre first of all has to establish that existence comes before essence. By this Sartre means that nothing of the individual subject can come into being before the individual exists. For unlike Descartes who believed that God preceded and designed humanity, Sartre argues that it is the individual subject that defines what it is to be a human being. This implies that when the individual subject defines his/her self s/he is also defining all human beings. The individual is then the one thing whose existence must precede essence. Initially this would seem to be an echo of Cartesian doubt, in that the only one thing any subject can be certain of is that "I exist". Although Sartre takes the Cartesian to be an indubitable truth he has little time for any resulting doubt about things in the world. Moreover, where Descartes uses God and the self to define all that is in the world, Sartre uses other subjects.

Sartre's negation of skepticism has its roots in the phenomenology of Husserl. Husserl argued that the question of existence of things should be set aside, so that we can concentrate only on our own experience and discover its essential structures. The implication of this for Sartre was that everything must lie outside of consciousness; even including the self. By this Sartre means existence or being is not achieved through passivity but only through action. There is at work here a kind of dualism, in that consciousness nor the actions or objects of consciousness can exist without each other, but at the same time they are separate. That is, through choice and action we bring in to being the objects of the world and it is the objects or other subjects that define what we are. This freedom of choice does not lead to the meaninglessness that Nagel pointed to in his discussion of Free Will or Determinism. For Nagel argued that absolute freedom was meaningless as there would be no values or criteria by which the free individual could make choices. It would lead to merely random and valueless acts. For Sartre this is overcome as the situation in which we make our choices precedes us. We are born into a pre-existing world and make our choices in what is available there. To return to the example of Cantoni's installation, we would have made the choice to attend the gallery [having chosen to live the kind of life that involves attending art exhibitions] and then we would be faced with the choice of sitting or not sitting in the chair. If we choose to sit in the chair and happened to be the 500th person then we would have to face the fact that our choices had

consequences upon other people [in this case that would be the shooting and possible death of other people in the gallery]. Alternatively, if some other person was the 500th person to sit in the chair we would be at the mercy of another choices. Therefore, the individuals action has consequences for others and the act ions of others has consequences on the individual.

The grey area of Sartre's statement of existence preceding essence is in choosing ones actions if there is no moral objectivism. Why choose one act over another? The main motivation would appear to be concerned with freedom. For according to Sartre to deny ones own freedom is to be act in bad faith and so it must follow that to act in away that restricts others would also be an act of bad faith. If this is so then the only response to the Cantoni installation would be to avoid sitting in the chair altogether.

However is this not restricting the individuals freedom to interact with the work? In many ways this is the central dilemma of Sartre's philosophy. He seems to have merely taken God out of Descartes equation and replaced it with a subjective, secular morality in which the individual plays a "Godlike" role and develops an equally convoluted morality.

First Draft Essay - Submit :

Submit First Draft Essay

Date:

09/05/98

Time:

15:59:49

Remote User:

FirstDraftEssay_Entry Form

Bill Kerr (BKerr220@AOL.com)

Critically discuss Sartre's central claim in Existentialism and Humanism that "there is at least one being whose existence comes before its essence." Sartre's argument that existence comes before essence is centered around our freedom and responsibility to make the choices that define us within our environment. His claim is that, it is our actions that define us, and the responsibility for these actions and therefor the way we are defined within the world, lies entirely with ourselves. This essay will focus on whether our choices as individuals are completely free, or whether they are constrained by things outside ourselves such as circumstances and social conditioning. It will argue that although existence comes before essence, our choices and actions (and therefor any definitions of ourselves) are limited by the situation in which we find ourselves.

Sartre quotes Dostoevsky as saying "If God did not exist, then everything is permitted." He then affirms that, "everything is indeed permitted, and that that, for existentialism is the starting point". Because everything is permitted we must be responsible for our actions. There is no God, no higher authority that controls us, there is no determination. We can not search for safety in a grand plan for human kind, we are what we do and it is our actions that define us.

Sartre limits the influence of environment to what he calls "facticity", our decisions, he says should not be effected by our circumstances. It however seems that life is not like that, we all have an environment and a history, we come to this point in our lives with ideas and conceptions of ourselves and society.

While there is a lot in Sartre's philosophy that seems concrete, to me there is something missing. It seems that the choices we make, must to a certain extent be dictated by our circumstances. Take for instance, Sartre's own example of the young man who goes to him for advice on whether to stay at home to look after his ailing mother, or join the Free French Forces. If we look at the situation under which this choice must be made, we can see that the following conditions prevail. His mother is ailing and quarrelling with his father, who has become a "collaborator", it is a time of war, and his brother has been killed. These conditions serve to limit the young man's choice to one of the above options, he can not (or he feels he can not) go off and start a family, or indeed live his life in any way other than following one of the above two courses of action. These conditions then serve to limit his options, and they also must exist, in order that he has these choices. He can not for instance, join the Free French Force if such a thing does not exist. Sartre would of course reply, that all of these choices were indeed open to the young man, but he has already taken the decision to follow one of the two paths in question. This however, does not resolve the argument that prevailing conditions influence our decisions. The student's decision was affected by the circumstances in which he found himself. Likewise, our choices are influenced by our circumstances, our surroundings, our aspirations and our social conditioning. For example Nagel's simple illustration of the choice between a peach and a piece of chocolate cake. While making this choice a number of factors about our situation are under consideration. Will the cake make us fat? Do we care (have we been conditioned to care) if the cake makes us fat? Is our body allergic to either the cake or the fruit? Do we like both chocolate and peaches? Indeed, we can only choose either item from the café if we can pay for it. This view that the aspirations and circumstances of ourselves, and those around us, affect our decisions can be transferred to more complex choices than what we eat for lunch in a café. For instance, we may or may not, aspire to give up work and live a life of leisure in five star luxury, but we can not choose to do it, if we do not have the means to pay for

it.

It is quite easy to accept that there is no determinism, and that existence comes before essence. It then follows that we are free to make life changing decisions, and that we are accountable for our own action, or inaction. Therefore we are entirely responsible for the definition of ourselves in the world. It however, seems that those decisions are constrained not only by our circumstances, but also by our aspirations and social conditioning. Sartre's explanation of facticity does not, I feel, hold together under the above scrutiny. In short we are free to choose (to define ourselves) but only within the domain of our circumstances and aspirations.

Bibliography

Sartre, J. P. existentialism & humanism, (London, Random House, 1997)

Nagel, T. What Does It All Mean?, (New York, OUP, 1987)

Murdoch, I. Sartre, (London, Penguin, 1953)

First Draft Essay - Submit :

Submit First Draft Essay

Date:

03/06/98

Time:

14:15:13

Remote User:

FirstDraftEssay_Entry Form

(j.mason@mdx.ac.uk) Sartre is a fool.

3) Solution Web Survey

Clear_essay_assignment: NO

Understand_Background: NO

open response submit: Send Comments - click once

Essay2submit:

Date: 05/03/98

Remote Name: 158.94.59.179

Remote User:

P_StartEssay_OpenResponse: [Submit - open response]

Date: 05/03/98

Remote Name: 158.94.59.179

Remote User:

P_SampleEssay_OpenResponse:

text comments to sample

4) Second Solution Submission

Clear_essay_assignment:

Understand_Background:

open response submit:

Essay2submit:

Submit 2nd Essay

Date:

12/05/98

Time:

13:15:42

Remote User:

DraftEssay2

ks139@mdx.ac.uk Does Sartre's conception of the human condition have any moral implications? Before answering the above question, another needs to be explained first. This being what Sartre's conception of the human condition is, before the question of whether any moral implications occur. Sartre's primary question seems to be "What is it like to be a human being?" Here, he explains that human reality consists of two modes of existence, those of being and nothingness. Humans existing both as an in-itself and as a for-itself, as a consciousness or nothing. With existentialism, they root this in the experience of what it is really like to be a human being. They put forward the idea that there is no human nature, and as such, there are no general patterns of

behaviour and feeling appropriate to all human beings. It is an aspect of the human condition that we have to make value judgements, without any form of guidelines from outside ourselves. The main theme of this theory is the concern with the freedom of individuals. The belief in the ability of every person to choose for themselves their attributes, purposes, values and way of life is important here. The only authentic and genuine way of living is that which the individual themselves, freely chooses. We cannot help but be free and choose our way of living under these terms. Sartre also holds a viewpoint called Atheistic Existentialism, which puts the emphasis on the individual instead of on society. We have not been created for any purpose, by either God, nor evolution. We simply find ourselves existing and then we have to decide what to do and make with ourselves. This puts faith into question, and also the morality side of theology. Some may point out that if there is no God, what happens to morality? Sartre points out that we make our own values and morals, and so we take on the responsibility of all mankind. All actions that we make affect all others, so if we act in what we would consider a moral and upstanding manner, than this would affect all man into acting in a similar fashion. Seeing that we choose what to do with ourselves, it makes the predestination theory redundant, of which God is said to have for each of us. It seems that under this viewpoint, God is now just a predestination theory. A saying that may be seen to sum up existentialism as a whole is, "We are anything that we choose to be." In his view, we are condemned to be free. There is no limit to our freedom, apart from the fact that we are only limited by that freedom. It is impossible not to be free. Sartre also uses the term anguish. He uses the term to describe the consciousness of a man's own freedom. Anguish is not the fear of an external object, but the awareness of the unpredictability of man's own behaviour or existence. It is also the consciousness of our freedom, which is painful so we try to avoid it. This is illusory, because it is a necessary truth that we are free, and its only limit is freedom. Dostoevsky is quoted by Sartre as saying, if God did not exist, everything would be permitted." This is a major point in existentialism. This can be countered by saying that everything is permitted, but we have to regulate our behaviour because all action reflects and affects all man. Man cannot help but choose a morality, such is the pressure of circumstances upon him." So, you choose the morality that you have, depending on the circumstances you are in at the time. It could therefore be said that no particular set of morals is wrong, as they can change from day to day. The moral implications for this is that we have to affirm our morals by doing them in each set of circumstances. For example, we can say that we are honest, but just because we perform an honest action on one occasion, does not mean that we would do so again, if the circumstances were different. The moral implications for Sartre's views seem to be few and far between. For every argument against the morals presented here, it seems as though Sartre has a counter argument, so the implications are that we can live in what would be considered a moral manner, without the need for a God, nor other supernatural being. _Nigel Warburton. Philosophy - The Basics 2nd edition.

(Routledge, USA & Canada, 1995) p54-59 Diané Collinson. Fifty Major Philosophers. A Reference Guide. (Routledge, London, 1987) p158, Dion Scott-Kakures, Susan Castagnettes, Hugh Benson, William Taschek, Paul Hurley, et.al., History of Philosophy. Ed Thomas H. Quinn (Harper Perennial, 1993) p353, 359 Jean-Paul Sartre, Existentialism and Humanism. Trans. Philip Mairet. (London: Methuen, 1997) p33.

Clear_essay_assignment:

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open response submit:

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Submit 2nd Essay

Date:

12/05/98

Time:

15:39:08

Remote User:

DraftEssay2

(MH214@mdx.ac.uk) Critically discuss Sartre's central theme that there is at least one being whose existence comes before its essence (872 words)
Existentialism and Humanism stands as a defense of existentialism and supports the claim that the human condition is to exist first and have an essence later, to labor and die in this world and that during our lives it is up to us and the choices we make to define our essence. It also stresses the freedom we have to choose for ourselves the paths we wish to follow but adds the responsibility of choosing not only for ourselves but also for all of mankind. It condemns us to be free choosing individuals with no human nature to fall back on as an excuse and no illusions of afterlife to guide our actions and the choices we make in this life. Our essence can only be obtained through our existence as free willed beings constantly reinventing ourselves through the actions we take. By living as free individuals we will only acquire an essence after death.

Sartre first examines the opposite view; that essence precedes existence. He uses the example of a paper knife. It is clear to see that the artisan must have had a conception of the paper knife before producing it. From a religious view point we could say that God is the artisan and only through God's conception of us are we created at all: "God makes man according to a procedure and a

conception" (*Sartre, p27). Only through this conception of the paper knife can the paper knife be produced; therefore its essence must precede its existence in this. Sartre argues the opposing view though was that only through our existence and the choices that we make can we become who we are and obtain an essence.

Sartre is an atheist existentialist who claims that if God does not exist then there must be at least one being whose existence becomes before its essence. This being is man and through his existence he acquires an essence through his past actions. Are actions the result of the freedom of our choices, but choice is consciousness and consciousness doesn't have an essence. Through the actions that we take we are laying a trail behind us.

When man takes action and makes a decision to what he will make of himself, he will not become what he wishes to be until he has followed his actions through: "He will not be anything until later, and then he will be what he makes of himself" (*Sartre, p28). There are no guarantees though that he will ever be what he wishes himself to be and man will remain incomplete whilst still living.

The relationship between essence and existence, or "necessity and contingency" (Whitford, p13) is one of the central philosophical problems in twentieth-century France. Sartre claimed that we do not obtain an essence until after we are dead, for until that time we are still making choices and changing the course of our lives through the decisions we make. It follows then that we can not be complete until we have ceased to exist and no longer can become anything other than what we are at our time of death: "our identity cannot be said to be complete while we are still alive because the process of creation is still going on" (Whitford, p13). It was Sartre's belief that those who take refuge in essence and identity are avoiding the responsibility that freedom involves. For complete freedom is often associated with abandonment and despair when faced with difficult choices in our lives. When contemplating these ideas, we realise that we are held completely responsible for the outcomes of the choices we make which is why some are filled with despair when considering Sartre's existentialist philosophy. With this knowledge we realise that we have no true self but what we take to be our true self is reinvented through our actions and projects we undertake.

Sartre adopts an ethics of freedom and includes a moral code in a philosophy that states that there is no God or any particular guidelines to follow. Man does not only choose for himself but for the whole of mankind. From the choices we make, we are being "creative" and fashioning our image as we believe man should be: "To choose between this and that is at the same time to affirm the value of that which has been chosen" (*Sartre, p29). Therefore there is a restriction on the values that you can hold. If Sartre were to make the decision to get married that would mean that he had committed himself to monogamy and held the responsibility of practicing it. He is saying that he affirms these values and that this is a standard that he believes all people should follow; "In fashioning myself I fashion man" (*Sartre, p30). His moral code consists of our freedom and not suppressing the freedom of others.

Although we are abandoned in a world with no ethics and moral standards we still held responsible for our own actions and not taking away that complete freedom from anyone else. On our own we must set the values for our own societies and try to live accordingly to how we believe man should live.

*Existentialism and Humanism

Bibliography

Jean-Paul Sartre Existentialism and Humanism (mentheun)

Margaret Whitford Merleau-Ponty's Critique of Sartre's Philosophy (French Forum Publishers)

Clear_essay_assignment:

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open response submit:

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(jk130@mdx.ac.uk) Does Sartre's conception of the "human condition" have any moral implications?

One of the fundamental theories of Sartre's existentialism is the human condition. He replaces human nature with what never changes "having to labour and to die". Human condition is universal and implies universality of purpose, which is the human actions against the limitations of that condition. Sartre is an atheist, he denies the existence of God and therefore any moral commandments. He seems to say that everything is allowed but this is not the case. The people strive to affect the same limitations, and the only restraint is freedom, either our own or others. Freedom is the principle. Sartre says that man is free, man is freedom. This is the foundation of all values, freedom as a value in itself gives action the ultimate significance therefore we ought to will for it. The truth of the Cartesian Cogito implies indirectly that it is not only an individual freedom, but also everybody else's. We find ourselves in Cogito but we find others as well. This is through the others that we are able to learn about ourselves. We can not become anything other than others impression of

us because we create these impressions through our actions. We create ourselves unrestricted and at all times. Anything that people might decide to do is their free choice. Sartre says that even if someone assumes a passive position it is important to realise that it is still a free choice. That free choice implies a moral consequence and that is responsibility. On one hand that causes anguish. People can not avoid involvement, they must face a multitude of problems. What Sartre emphasises is that turning ones back on problems might be the answer but it does not free one from the responsibility. We are condemned by freedom. Whether we want it or not no one can avoid choices or the responsibility that stems from them. What is more, committing oneself to an action equals committing the whole of mankind. The actions which we undertake become legitimised through us doing them. In this Sartre employs the Kantian idea of a categorical imperative, "act as if the maxim of your action were to become a general natural law". That eliminates caprice or fantasy as motives of human actions, because the responsibility is too profound. It does not ease the problem of choice. There is nothing that can help with making a decision, that is why Sartre is talking about inventing oneself. He explains that by the example of a boy who during W.W.II is faced with a difficult problem and seeks advice from Sartre himself. The only one that Sartre can give is that the boy has to come up with an answer on his own. Sartre says that there is no universal path for the boy to follow, also that in his subconscious the boy has made the decision already since he had chosen Sartre as an adviser. People know what sort of an advice they are about to get from whom they ask, so when asking for advice they are committing themselves to a specific course of action already. Sartre says that whatever the boy does should agree with his intuition, there is no one right way to act. He will be right as long as he acts in good faith, as long as he does not "take refuge behind the excuse of his passion, or by inventing some deterministic idea". Committing oneself to a certain choice is like a work of art. Sartre says that we do not judge an artist before he finishes his creation. There are no rules to tell him what should be his inspiration or how to work, all there is to place our judgement upon is the final version. We cannot accuse an artist of irresponsibility. It is like the decisions we make, they represent our state of mind, experiences from past times and the sum of circumstances we have contribute to the choices we make. Sartre's morality, which is influenced strongly by his metaphysical observations, takes away human excuses and help we expect. Through his ethics he provides universality and impartiality of morality saying that there is no reason why the freedom of others should get any less consideration then our own. Sartre says that people from any time in the history and any cultural background can understand each others longing for freedom. This is the universality that we create through our actions.

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DraftEssay2

(jk130@mdx.ac.uk) Does Sartre's conception of the "human condition" have any moral implications?

One of the fundamental theories of Sartre's existentialism is the human condition. He replaces human nature with what never changes "having to labour and to die". Human condition is universal and implies universality of purpose, which is the human actions against the limitations of that condition. Sartre is an atheist, he denies the existence of God and therefore any moral commandments. He seems to say that everything is allowed but this is not the case. The people strive to affect the same limitations, and the only restraint is freedom, either our own or others. Freedom is the principle. Sartre says that man is free, man is freedom. This is the foundation of all values, freedom as a value in itself gives action the ultimate significance therefore we ought to will for it. The truth of the Cartesian Cogito implies indirectly that it is not only an individual freedom, but also everybody else's. We find ourselves in Cogito but we find others as well. This is through the others that we are able to learn about ourselves. We can not become anything other than others' impression of us because we create these impressions through our actions. We create ourselves unrestricted and at all times. Anything that people might decide to do is their free choice. Sartre says that even if someone assumes a passive position it is important to realise that it is still a free choice. That free choice implies a moral consequence and that is responsibility. On one hand that causes anguish. People can not avoid involvement, they must face a multitude of problems. What Sartre emphasises is that turning one's back on problems might be the answer but it does not free one from the responsibility. We are condemned by freedom. Whether we want it or not no one can avoid choices or the responsibility that stems from them. What is more, committing oneself to an action equals committing the whole of mankind. The actions which we undertake become legitimised through us doing them. In this Sartre employs the Kantian idea of a categorical imperative, "act as if the maxim of your action were to become a general natural law". That eliminates caprice or

fantasy as motives of human actions, because the responsibility is too profound. It does not ease the problem of choice. There is nothing that can help with making a decision, that is why Sartre is talking about inventing oneself. He explains that by the example of a boy who during W.W.II is faced with a difficult problem and seeks advice from Sartre himself. The only one that Sartre can give is that the boy has to come up with an answer on his own. Sartre says that there is no universal path for the boy to follow, also that in his subconscious the boy has made the decision already since he had chosen Sartre as an adviser. People know what sort of an advice they are about to get from whom they ask, so when asking for advice they are committing themselves to a specific course of action already. Sartre says that whatever the boy does should agree with his intuition, there is no one right way to act. He will be right as long as he acts in good faith, as long as he does not "take refuge behind the excuse of his passion, or by inventing some deterministic idea". Committing oneself to a certain choice is like a work of art. Sartre says that we do not judge an artist before he finishes his creation. There are no rules to tell him what should be his inspiration or how to work, all there is to place our judgement upon is the final version. We cannot accuse an artist of irresponsibility. It is like the decisions we make, they represent our state of mind, experiences from past times and the sum of circumstances we have contribute to the choices we make. Sartre's morality, which is influenced strongly by his metaphysical observations, takes away human excuses and help we expect. Through his ethics he provides universality and impartiality of morality saying that there is no reason why the freedom of others should get any less consideration than our own. Sartre says that people from any time in the history and any cultural background can understand each others longing for freedom. This is the universality that we create through our actions.

5) End Web Survey

Date forwarded: Fri, 22 May 1998 13:26:50 +0000 (GMT)
Date sent: Fri, 22 May 1998 13:26:27 -0700
Forwarded by: anthony13@bg1.mdx.ac.uk
From: KRISTA STEVENS <KS139@mdx.ac.uk>
Subject: Re: DELBERT Questionnaire
Forwarded to: ANTHONY13@nw.mdx.ac.uk
To: A.Basiel@mdx.ac.uk
Organization: Middlesex University

Anthony Basiel wrote:

>

> Hello Philosophers-

> We hope your exams went well.

> This will be the last contact with

- > you on DELBERT, unless you reply
- > to come for the free lunch on Wed.
- > 24 June 1pm @ BG.
- >
- > Below is a short 10 question survey which will
- > take only 5 minutes to do. Your response
- > is important to my research! Please REPLY
- > to this e-mail including the original text.
- > Then just "X" the answer and fill in the
- > blank for open responses.
- > Thanks in advance -
- > Skip
- > ~~~~~
- > DELBERT Questionnaire
- > Please tick "X" for YES or NO for each question.
- > Comments may be added after each response.
- >
- > 1) Did you find using DELBERT a useful experience? YES_x_ NO__
- > If not, Why? _____
- > 2) Would you use a DELBERT Tutorial in the future? YES_x_ NO__
- > If not, Why? _____
- > 3) Would you tell your friends about DELBERT ? YES_x_ NO__
- > If not, Why? _____
- >
- > 4) After the assignment and the sample essay,
- > did you submit the survey form? YES_x_ NO__
- > If not, Why? _____
- > 5) Did you research your essay before submitting your solution?
- > YES_x_ NO__
- > If not, Why? _____
- > 6) Did you submit information to an Active Entry Page? YES__
- > NO__
- > If not, Why? _____
- >
- > 7) Did you read other student's essays in the tutorial? YES__ NO_x_
- > If not, Why? _____
- > 8) Did you contact other essay authors about their submissions?
- > YES__ NO_x_
- > If not, Why? _____
- >
- > 9) Did you contact Jeff or Skip for help with the tutorial? YES_x_
- > NO__
- > If YES, Why? __Just for things needed for arguments in
- > essay _____
- >
- > 10) What internet tools did you use for your research?

> (tick as needed)
 > ☒_x_None ☐search engines ☐meta-search tools ☐on-line references
 > ☐_e-mail ☐BBS/news groups ☐DELBERT mentor help
 > Other details _____
 >
 > Thanks for your time and help!
 > Just REPLY to this e-mail.
 > Cheers,
 > Skip and Jeff
 > Anthony "Skip" Basiel
 > Research Student
 > Middlesex University
 > Bounds Green Road
 > London, England
 > N11 2NQ
 > ~~~~~
 > E-mail: a.basiel@mdx.ac.uk
 > Tel:(44)0181-362-6848
 > FAX:(44)0181-362-6411
 > URL: http://skip.mdx.ac.uk
 > Video Conference - 158.94.59.179
 > ~~~~~
 > Visit DELBERT soon at:
 > http://skip.mdx.ac.uk/DELBERT/
 > ~~~~~

6.) Video Conference Interview

Hi! Can you see me OK?

I have a few quick question, are you ready?

Did you reply to the questionnaire after the assignment essay and the sample essay? If not why?

What internet tools did you use to research your essay? Search engines, News groups, E-mail an expert, or something else? If none why?

Did you submit anything to DELBERT besides the essay?
(i.e. - A new web link) If not why?

Did you read other student's essays? If not why?

Did you contact other authors about their essays? If not why?

Did you contact Jeff or myself about DELBERT? If not why?

Summary: The session was conducted on 18 May 1998 from 1 -2 p.m., and 26 May noon -2pm between Bounds Green and Tottenham campuses.

- 1) The students felt that the video image was clear enough for the interview.
- 2) The students were ready to begin the interview straight away.
- 3) The majority of the students did not submit a reply to the web survey after the assignment essay. They felt it was not required and they did not have much time.
- 4) Some of the students used web search engines. Some contacted Dr. Mason by e-mail. A majority used the web links inside the tutorial.
- 5) Active entry submissions were not done by the students due to two reasons:
 - a) The students were novice internet users and felt unsure about the process
 - b) It was not required for points towards the essay
- 6) The majority of the students read each others essays.
- 7) The students did not make a big effort to contact each other for the same reasons outlined in question 5.
- 8) Several students sent private e-mails to the lecturer, Dr. Mason and the LED, Skip Basiel. They felt less embarrassed then publicly posting the query to the page.

7) Sample of an Annotation Page

Annotation Page:

Click Netscape Menu Bar:

- 1) File / Edit Page
- 2) Delete the text and image on this page
- 3) Enter you own notes
- 4) Save as an HTML file in you local disk

This is a sample of the annotation log feature.

~~~~~

**Sample Plan of Action:**

- 1) Set the dates for the assignment
- 2) Do the background reading
- 3) Compose the first draft
- 4) Submit the first draft to DELBERT
- 5) Examine other samples
- 6) Contact other authors
- 7) Re-submit the second essay

~~~~~

Notes for the background reading go here:

~~~~~

**First draft essay here:**

~~~~~

Copy of e-mail correspondence here

~~~~~

**Second essay here**

~~~~~

8) Sample of Suggested Web Links

(Supplied by Dr. Mason)

Below are some weblinks that will be helpful to solve the
problem. Remember:

<CAUTION: External Links> These links will take you
outside the tutorial. Use the BACK button on the top of the browser to
return one page.

Or if you have set the browser's home button to the tutorial,
just click HOME to return to the main menu.

The links below are in these sections:

1. Glossary and Reference
2. Writing Aids - The Elements of Style
3. General Philosophy Web Sites
4. Existentialism and Sartre
5. Add you own website links

1) Category: Glossary and Reference

The new HUMBUL Gateway contains a large collection of high quality links to scholarly resources.

<http://users.ox.ac.uk/~humbul/>

A Dictionary of Philosophical Terms and Names

<http://people.delphi.com/gkemerling/dy/index.htm>

The Dictionary of Philosophy of Mind

<http://www.artsci.wustl.edu/~philos/MindDict/index.html>

A web of on-line dictionaries

<http://www.bucknell.edu/~rbeard/diction.html>

Thesauri and Other Vocabulary Aids

<http://www.bucknell.edu/~rbeard/diction1.html#thesauri>

A web of on-line grammars

<http://www.bucknell.edu/~rbeard/grammars.html>

2) The Elements of Style

To write clear prose, read White and Strunk's The Elements of Style on the World Wide Web. Copy and paste the advice you most need to a floppy disk after you save it on the H: Drive in you Novell account.

<http://www.cc.columbia.edu/acis/bartleby/strunk/>

3) General Philosophy Web Sites

INTERNET SERVICES FOR PHILOSOPHERS

http://www.phil.ruu.nl/philosophy_services.html

Philosophy in Cyberspace: An annotated guide to philosophy-related resources on the internet, indexing more than 1500 philosophy-related sites, over 300 mailing lists and approximately 60 newsgroups.

<http://www-personal.monash.edu.au/~dey/phil/index.htm>

Mohr's Philosophy Exercises: Philosophy Web-Browser Exercises:

This site gives detailed instruction on how to use the WWW for your study.

<http://academic.uofs.edu/faculty/pm363/menu.htm>

Electronic Texts: A Hypertext repository of Philosophical Texts.

<http://www.bris.ac.uk/Depts/Philosophy/VL/etexts.html>

Sites Devoted to Individual Philosophers :Alphabetical Index

<http://users.ox.ac.uk/~worc0337/philosophers.html>

The Internet Encyclopaedia of Philosophy

<http://www.utm.edu/research/iep/>

Stanford Encyclopaedia of Philosophy

<http://plato.stanford.edu/contents.html#m>

The Ism Book: A Field Guide to the Nomenclature of Philosophy

<http://www.plantagenet.com/~stpeter/ism/ism.html>

4) Existentialism and Sartre:

A rough guide to Continental Philosophy. A resource for finding out about philosophy in continental Europe, including basic introductions to the life and work of major thinkers.

http://ourworld.compuserve.com/homepages/mrs_entity/

Jean-Paul Sartre: French Existentialist 1905-1980

<http://www.trincoll.edu/~tj/philo/phils/sartre.html>

Jean Paul Sartre {1905-80}

<http://www.tcp.chem.tue.nl/~tgtdmv/simone/sartre.html>

The Realm of Existentialism

<http://members.aol.com/KatharenaE/private/Philo/philo.html>

Introduction to Existentialism and Phenomenology

http://ourworld.compuserve.com/homepages/mrs_entity/intro.htm

Jean-Paul Sartre

<http://www.hove.co.uk/philos/sartre.htm>

Consciousness as a metaphysical category in Sartre (essay)

<http://www.trevecca.edu/students/jsykes/papers/sartre.html>

Bjorn's Guide to Philosophy - Sartre

<http://www.knuten.liu.se/~bjoch509/philosophers/sar.html>

Sartre Student Links

<http://www.nd.edu/StudentLinks/akoehl/Sartre.html>

9) Samples of Active Entry Submissions

Date:

01/12/98

Time:

03:49:17

Remote User:

Comments

carverc@tca.net/APPLICATION LEVEL GATEWAY [FIREWALL] -A
firewall system in which service is provided by
processes that maintain complete TCP connection state and sequencing.
Application level firewalls often re-address traffic so
that outgoing traffic appears to have originated from the firewall, rather than
the internal host.[<http://206.96.207.5/security>]

SubmitWebLinks:

Submit New WebLinks

Date:

21/06/99

Time:

09:15:17

Remote User:

PhilosophyActiveWeblinks

amiah@dmu.ac.uk Sport Philosophy Web

[<http://www.dmu.ac.uk/dept/schools/pesl/affiliat/contents.htm>]

SubmitGlossaryTerm:

Submit Glossary Entry

Date:

28/10/98

Time:

04:03:43

Remote User:

ActiveGlossaryForm

vivienwo@yahoo.com What was the one vs. many debate?
What's the essence of Kantian theory

SubmitGlossaryTerm:

Submit Glossary Entry

Date:

10/01/99

Time:

21:47:47

Remote User:

ActiveGlossaryForm

atryk@goplay rennaissance

SubmitGlossaryTerm:

Submit Glossary Entry

Date:

10/01/99

Time:

21:49:40

Remote User:

ActiveGlossaryForm

[atryk@hotmail.com] [rennaissance] [philosophy]

APPENDIX F

Section 1: CLD Workshop Transcripts

Section 2: E-mail summary

Section 1: CLD Workshop Transcripts

Below is a copy of the dialogue posted on the CLD workshop page:

<http://skip.mdx.ac.uk/CLD/DELBERTdemo.htm>

Date:

05/02/99

Time:

10:28:35

Comments

[Skip] Hello, Welcome to the demo!

Date:

19/02/99

Time:

20:51:17

Comments

[skip] the same, just because

Date:

19/02/99

Time:

20:52:08

Comments

[group10] The water level goes down.

Date:
19/02/99
Time:
20:52:20

Comments

[Archimedes' Crewe] No.

Date:
19/02/99
Time:
20:53:08

Comments

[The Neptune Group]

THE WATER GOES UPPPPPPPPP!

Date:
19/02/99
Time:
20:53:17

Comments

[Roy, Bill, Gabe] The water level stays the same if the specific gravity of the cube is less than 1, otherwise the water level goes down (assuming no water splashes out of the pool when the cube is thrown in and the man and cube together do not weigh enough to have sunk the boat in the first place).

Date:
19/02/99
Time:
20:53:33

Comments

[The Neptune Group]

THE WATER GOES UPPPPPPPPP!

Date:

19/02/99

Time:

20:54:20

Comments

[epm] The water level goes down because metal is denser than water.

Date:

19/02/99

Time:

20:54:53

Comments

[group10] The water level goes down.

Section 2: E-mail

Section 2: E-mail Summary

From: Andrew Roberts <a.roberts@mdx.ac.uk>

On 24.6.1998 the Centre for Learning Development's electronic learning forum was on web based learning. Anthony "Skip" Basiel explained his system of teaching and learning on the web according to constructivist rather than behaviourist principles. The session was notable in advance because a web link was provided that showed us, on the web, some of what we would hear at the forum, and setting up an electronic mailing list that participants could use to contact one another.

The forum was in two parts: a presentation and a workshop session. In the workshop session I was struck by the parallels between my own thoughts on

the development of my essay writing course for social scientists, and the thinking of Anthony Basiel and his philosophy collaborator, Jeff Mason. They approached issues from a high technology position that I approached from a low technology one. I was experimenting with email in teaching, but had no idea how to use the web. In simple terms, my problem was to start students writing early in the course, so that they would learn through action. The solution I tried was moving from a mainly seminar based course to a mainly email based one. Anthony Basiel also wanted to start from student action, with consequent feedback and reflection fuelling further action - the essence of constructivism.

The workshop session attempted to overcome the prejudice that electronic education is an activity for isolated individuals who are not collaborating. We formed groups around a computer to work on a group project that Anthony Basiel had devised concerning the displacement of water by an object. I would have liked to have been told the answer (!). However, the point was for us to see the ways in which collaboration can take place in web based learning. The small group discussion I was in generated ideas that I continued to discuss in relation to the "Human Computer Interface" with Judith Harding (CLD) by email after the workshop, and which have since formalised in my mind on the model that Charles Crook uses. Crook distinguishes between collaboration with computers (replicating principles of collaboration in computer programmes), collaboration at computers (groups working together at a computer task), collaboration in relation to computers (for example, talking in class about issues flowing from a computer activity) and collaboration through computers (reading and writing emails and writing on the web).

In numerous ways this workshop fed into and added fuel to the project that I have developed to develop a system of flexible learning that uses electronic communication with a campus based community core. Because Anthony

Basiel's work was on the web, I was able to study it. I adapted the principles of his high technology approach to the low technology aptitudes of most of my students and myself. This had advantages and disadvantages. Because it was popular with students who had not used computers before, the project generated a larger volume of email than I could manage. At this point Anthony Basiel was able to support me by pointing out the use of filtering (a feature he stressed at the workshop).

Ken Goulding had spoken to me some time ago about the need to find ways of sharing experience across modules. I was struck by the ease with which I could study what Anthony Basiel is doing on the web. This was one of the reasons that I set up my own web site and developed the system of collaborating through emails and over the web that I now call "web-working". By doing this, other people are able to see and analyse what I am doing in my area in the same way that they can in Anthony Basiel's.

The values of Forms implanted within web pages, combining the active learning virtues of email with the passive assimilation and active teaching of web browsing, was pointed out to me by Anthony Basiel. It fits in well with suggestions for the way forward for interactive, collaborative education that are being made by Charles Crook. The use I have made of Forms can be seen on my web site by following the link to Society, History and Environment (SHE) and scrolling down to the web submissions. SHE students now have a web review as their second writing task. They submit this review by the Form, and the collection of reviews is used to compile the review of Middlesex University's web resources that accompanies the listing on my Study Link page. The home page for my site is:
<http://www.mdx.ac.uk/www/study/>

APPENDIX G

Educational Technology Class Transcripts

Copy of the dialogue from the Educational Technology Classes at the School of Computing Science at Middlesex University -

<http://skip.mdx.ac.uk/Teaching/com3120.htm>
<http://skip.mdx.ac.uk/Teaching/com2100.htm>

Date:

23/02/98

Time:

13:12:39

Remote User:

COM2100Comments

[Anthony "Skip" Basiel-a.basiel@mdx.ac.uk] Welcome COM2100 students. Please enter any comments or information in the form above and submit it to this page. Thanks.

Date:

27/02/98

Time:

09:18:40

Remote User:

COM2100Comments

[Anthony "Skip" Basiel - a.basiel@mdx.ac.uk] Some e-mail copies of interest?

~~~~~ Date sent:

Thu, 26 Feb 1998 16:51:30 -0800 From: "Andrew J.

Mutch" Subject: Kiosk Navigator To: Multiple recipients of list Send reply to: amutch@tln.lib.mi.us

Hi again,

I have been contacted by a number of you about your inability to reach the page that describes how to set up Navigator in Kiosk mode using Javascript. The virtual addressing on our cooperatives

server has failed and has made this address  
unavailable(If you think your unhappy...let me tell you about my day!).

You can reach this page at this address instead:

<http://dn.lib.mi.us/~nort/tech/kiosk.htm>

Andrew Mutch Northville District Library Northville, MI

>>>>>AND<<<<<<<<<<

Date sent: Thu, 26 Feb 1998 16:36:12 -0800 From: lalexander@acad.com  
Subject: Re:Session Capture and Display To:  
Multiple recipients of list Send reply to: lalexander@acad.com

Marty,

I have been using a free tool from the Microsoft Office suite (95) that is  
simply called Camcorder. It captures screens in  
real-time and then plays them back. I believe you can loop the playback for  
unattended demos. Perhaps this will fit the bill? I  
only know of one ftp site that still has this program. However, if you have a  
problem downloading it I'd be happy to attach it to  
an email; it's under 700K.

Place this ftp address in Netscape to retrieve:

[ftp://ftp.hiroshima-  
u.ac.jp/pub/windows/cica/win95/desktop/camcordr.exe](ftp://ftp.hiroshima-u.ac.jp/pub/windows/cica/win95/desktop/camcordr.exe)

Larry Alexander Dir. of Electronic Publishing Academic Press, San Diego

Date:  
06/03/98

Time:  
14:45:00

Remote User:

COM2100Comments

(Donna Tomlinson DT069) nhm.ac.uk/sc/

Date:  
12/03/98  
Time:  
13:25:56  
Remote User:

COM2100Comments

[ a.basiel@mdx.ac.uk ] More Stuff- 1) Have a look at a good overview of instructional design by FKA ( a company in Canada) at <http://www.fka.com/>

2) The (DfEE) Department for Education and Employment is a good source of information.

<http://www.open.gov.uk/dfee/dfeehome.htm>

Date:  
07/04/98  
Time:  
13:22:05  
Remote User:

COM2100Comments

Skip Says: check out the Centre for Electronic Arts, from the Cat Hill Campus at:

<http://www.cea.mdx.ac.uk/CEA/Students.html> Good stuff.....

[Skip Basiel - a.basiel@mdx.ac.uk]

Hello COM3120 students.

I hope this website will be helpful.

Please give any feedback about its design or educational value.

Date:  
16/02/98  
Time:  
19:27:41  
Remote User:

COM3120Comments

Suley ( [suley@lovemac.demon.co.uk](mailto:suley@lovemac.demon.co.uk) )

In regards to the evaluation (critique form) that skip has sent us. This sounds a bit like "usability engineering". One of the current developments in the WWW is the development of good web sites that is usable (the user can perform a task with ease of use).

My project (com3992) is based on WEB USABILITY. This project can be found in the development stages in HTML format at the address <http://members.xoom.com/lovemac>. Or you can go to Jakob Nielsons site (Highly recommended) at <http://www.useit.com>. A brilliant discussion on web usability...especially Scott Butlers amusing mail on how there are no differences between traditional GUI designing and Web site designing.

Date:

16/02/98

Time:

19:35:18

Remote User:

COM3120Comments

Suley ( [suley@lovemac.demon.co.uk](mailto:suley@lovemac.demon.co.uk) )

woo hoo. I like this \*well done skip\*. Anyway...there is a groovy web site in New York (via Internet...of course) that talks about multimedia technology (in fact it uses the phrase media too much) at the address <http://www.mediaworkshop.org/>. you may find Multimedia evaluation at [www.mediaworkshop.org/meg.html](http://www.mediaworkshop.org/meg.html). have a read.

SPURS RULE

Date:

16/02/98

Time:

19:44:59

Remote User:

COM3120Comments

Suley (suley@lovemac.demon.co.uk)

Who is getting sick of Suley---STAND UP. Well I have found a useful set of Criteria from CDIOC group at <http://www.archimuse.com/cidoc/cidoc.mmwg.eval.crit.html> I am glad I cam up with this Multimedia Evaluation. As it does give me the stepping stone on what I am going to do on this project. Any comments please E-mail me.

Oh...one little argument. After doing an HCI module last year (interface designing) I found that Jakob Nielson's Heuristic Evaluation very "valuable" in evaluating Interface...would this not be a part of the multimedia evaluation process. The group at CDIOC did not think so.

Date:

23/02/98

Time:

19:35:05

Remote User:

COM3120Comments

SUleyman Ali (suley@lovemac.demon.co.uk)

On the discussion of design at the seminar on Feb 17 I started to design my application. It is about teaching the basics of the Turkish language to anyone who wants to go to turkey (or other reasons). This is only the base...or the interface design. I just want to see what feedback (critical analysis/evaluation) on the site.

one suggestion: "is the midi music necessary in the background?"--I think this function only work with MS explorer!

Date:

24/02/98

Time:

11:28:53

Remote User:

COM3120Comments

Suleyman Ali (suley@lovemac.demon.co.uk)

Oh...sorry...I forgot to give my web address for the "speak turkish" site.

<http://members.xoom.com/lovemac/turkish>

feedback will be appreciated.

Date:

24/02/98

Time:

14:53:05

Remote User:

COM3120Comments

[derek14@mdx.ac.uk] just having a nose at the interactive bit there is an error on this page <<

Date:

26/02/98

Time:

10:35:15

Remote User:

COM3120Comments

Dick Bartram[rb072@mdx.ac.uk]

<http://curry.edschool.Virginia.edu/go/frog/menu.html>

Frog Dissection online!

Date:

26/02/98

Time:

22:56:55

Remote User:



COM3120Comments

Suleyman Ali (suley@lovemac.demon.co.uk)

I found a web site (article)that was particular interesting in terms of "how educational multimedia can overcome potential (& current) problems in education". This web article is an idcal read for our projects.

<http://www.bookbuilders.org/9603/educamul.htm>

Date:

27/02/98

Time:

09:17:39

Remote User:

COM3120Comments

[ Anthony "Skip" Basiel - a.basiel@mdx.ac.uk ] Some e-mail copies of interest?

~~~~~ Date sent:

Thu, 26 Feb 1998 16:51:30 -0800 From: "Andrew J.

Mutch" Subject: Kiosk Navigator To: Multiple recipients of list Send reply to: amutch@tdn.lib.mi.us

Hi again,

I have been contacted by a number of you about your inability to reach the page that describes how to set up Navigator in Kiosk mode using Javascript. The virtual addressing on our cooperatives server has failed and has made this address unavailable(If you think your unhappy...let me tell you about my day!).

You can reach this page at this address instead:

<http://tdn.lib.mi.us/~nort/tech/kiosk.htm>

Andrew Mutch Northville District Library Northville, MI

>>>>>AND<<<<<<<<<

Date sent: Thu, 26 Feb 1998 16:36:12 -0800 From: lalexander@acad.com
Subject: Re:Session Capture and Display To:

Multiple recipients of list Send reply to: lalexander@acad.com

Marty,

I have been using a free tool from the Microsoft Office suite (95) that is simply called Camcorder. It captures screens in real-time and then plays them back. I believe you can loop the playback for unattended demos. Perhaps this will fit the bill? I only know of one ftp site that still has this program. However, if you have a problem downloading it I'd be happy to attach it to an email; it's under 700K.

Place this ftp address in Netscape to retrieve:

<ftp://ftp.hiroshima-u.ac.jp/pub/windows/cica/win95/desktop/camcorder.exe>

Larry Alexander Dir. of Electronic Publishing Academic Press, San Diego

Date:

03/03/98

Time:

17:29:30

Remote User:

COM3120Comments

Date:

12/03/98

Time:

13:24:26

Remote User:

COM3120Comments

More Stuff- 1) Have a look at a good overview of instructional design by FKA (a company in Canada) at <http://www.fka.com/>

2) The (DfEE) Department for Education and Employment is a good source of information.
<http://www.open.gov.uk/dfec/dfeehome.htm>

Date:
07/04/98
Time:
13:21:23
Remote User:

COM3120Comments

Skip Says: check out the Centre for Electronic Arts, from the Cat Hill Campus
at:
<http://www.cea.mdx.ac.uk/CEA/Students.html> Good stuff.....

Date:
21/04/98
Time:
20:54:30
Remote User:

COM3120Comments

Malcolm Clarke [mc140@mdx.ac.uk] The script to change the cursor from
the arrow to the "hand" is as follows: TO HANDLE
mouseEnter syscursor =44 END TO HANDLE mouseLeave syscursor =1
END This works for other cursors as well. See
Toolbook help for list of cursors - keyword sysCursor!

APPENDIX H

List of Publications -

1996:

1."Development of Educational Technology and Distance Learning at Middlesex University, London - The INT1000

Interactive Multimedia Tutorial", AISB Conference- Postgraduate Workshop, Brighton - UK, 1 April 1996

2." Video Communication for Distance Learning" MUCORT'96 Conference, Middlesex University, London - UK , 17

December 1996

1997:

1."Evaluation Methodologies for Web-based Distance Learning Material", NAU/web'97, Flagstaff, AZ - USA, 12-15

June 1997

2."An Investigation in Evaluating Web-based Tutorials", ED-MEDIA/ED-TELECOM'97, Calgary - Canada, 14-19 June

1997

1998:

1."Web Based Learning and the SOFA Principle", Computing Science and Telecommunication in the Millennium

Conference, Middlesex University, London - UK, 1 April 1998

2. "Web-Constructivism using Javascript", HCT Conference - University of Sussex, Brighton - UK 2-10-98

1999

1. "Web-Constructivism using Javascript", ED-MEDIA'99 Conference -
Seattle, Washington - USA 19-24 June 1999 Paper and poster / demo

